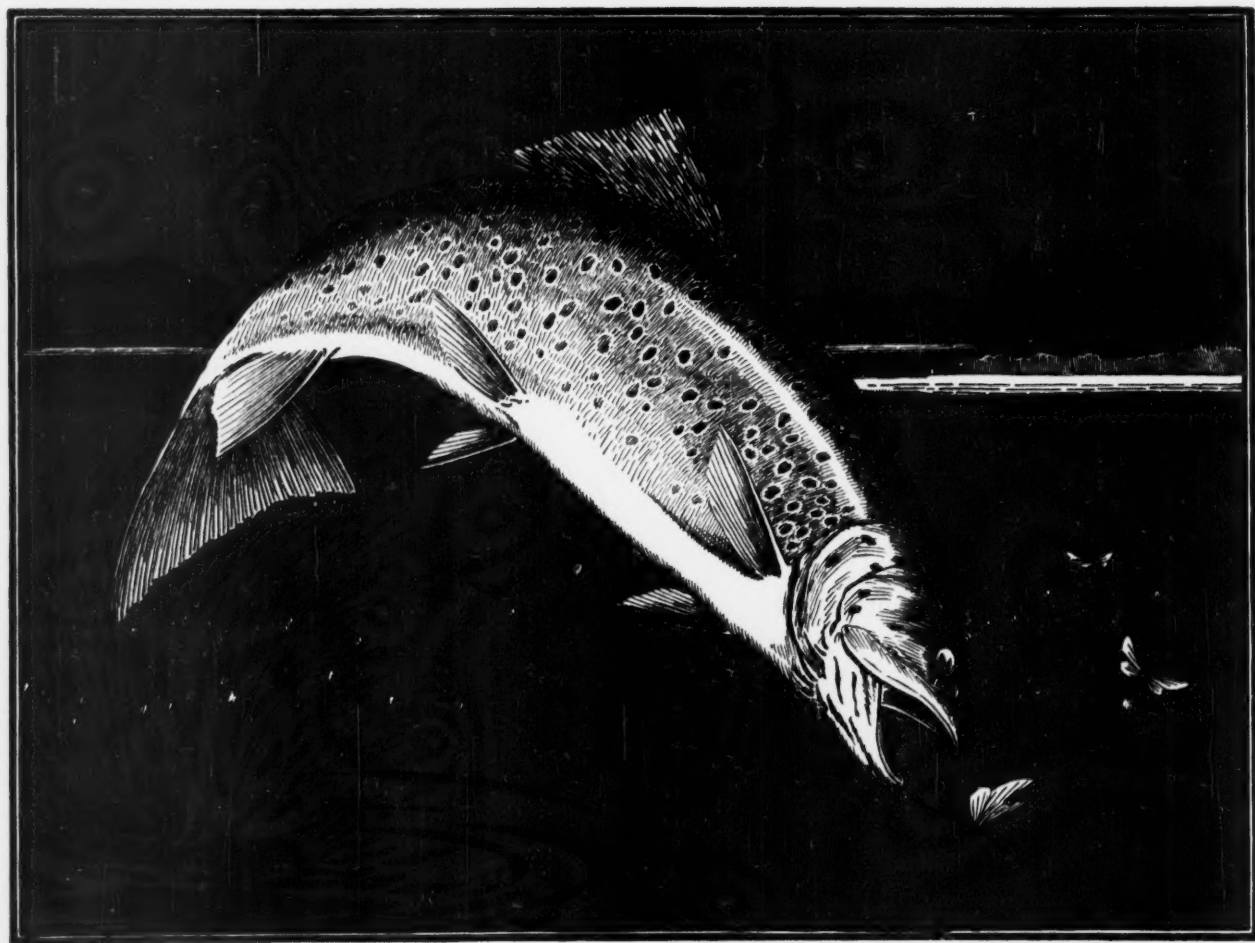



Nature *Magazine*

APRIL 1954

VOLUME 47 NUMBER 4

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Nature in Print

By HOWARD ZAHNISER

TWO small volumes, either of which could be read and pondered in an evening, have come to my attention recently, almost simultaneously, and have seemed to me again and again to have a special meaning for all of us who are concerned with human welfare in terms of conservation and our relationships to life. One of them, entitled *Trends of Life*, was written by an Englishman, who says in his introductory that he "has passed the limits of three score years and ten and has devoted the whole of his working life to the study of living things, both in the field and in the laboratory." The other, called *Resources and The American Dream, Including a Theory of the Limit of Growth*, was written by an American conservationist, Samuel Ordway, Jr., the vice-president of The Conservation Foundation who is also now chairman of the Natural Resources Council of America, a council of all the leading national conservation organizations of the United States. Both authors write as individuals. Both include implications that they represent minority opinions. Yet both seem to me to have perceived truth, and to have written valuable guide books, leading us gently away from a mechanistic view of life with its emphasis on a materialism sure to damn us sooner or later, and directing us rather to a vitalism, a reverence for life, and "the security of life which exists where men are working with nature to produce more than they consume."

Professor Jones postulates "that 'life' is a quality added to and not inherent in matter itself," and further that "the distinction of living matter is its power of self-maintenance which is manifested in activities that are characteristically directive." He believes in the thesis that "the developments of the living organism are directed towards the ends that they will serve." He admires "the older naturalists, who were not instructed in the modern artificial laboratory methods employed in the study of life, [but who] gleaned their knowledge from observations made on living creatures in their natural surroundings." With this central regard for life itself, he traces in the main body of his little book the history of thought on vitalism and its evidences, in chapters entitled "The Internal and External Nervous Systems," "The Parallel Development of Organs," "The Parallel Development of Types," "Correlations," "Embryonic Life," "Birth," "Change of Habit," "The Inheritance of Adaptations," and "The Trend of Evolution." As the final outcome of all this he sees the living creature becoming "functionally and structurally modified in adaptation to the demands of its immediate environment," and he observes that to become perfectly adapted to an environment is to become a slave to it. He reiterates: "The living thing that is completely successful in attaining to perfect adaptation to its environment is ultimately doomed; the one that is not so successful succeeds in maintaining its existence under changing conditions."

Professor Jones looks on man as "one of the least specialized of the mammals," as "not originally specialized for any definite environment," as a mammal that "always made his own environment for himself." Yet he does not think it likely that "man will escape from the general trend of evolution," and he fears for man a slavery that he already seems to perceive and which he describes as "the degenerative bondage of the dependent domesticated animal." For man, it appears to Professor Jones, "has now made his own environment of what is known as civiliza-

tion," and he warns of slavery, as follows, in a most startling paragraph:

"What man fails to realize is the fact that, under the conditions that he euphemistically terms modern Western civilization, he has subjected himself to all the influences that domestication exerts upon other animals. It is impossible to discuss the status of modern man, or to make even a guess as to his possible future, unless we bear constantly in mind the fact that we are dealing with a domesticated animal."

Reading this, one senses with stark newness the values of wilderness areas and all other resources whereby men can maintain their access to wildness. One sees a new avenue toward the deep meaning of Thoreau's dictum: "In wildness is the preservation of the world." And one hopes that Professor Jones's prophecy, like Jonah's before him, will ultimately be realized more in correction than in prediction.

With the divorce from Nature that human domestication involves, Professor Jones sees a "steady decline in human wisdom." He sees man "exterminating the animals and plants that depend for their special environment upon conditions that he destroys wherever he is free to do so." He laments: "It used to be said that Man by his scientific knowledge had caused the desert to bloom; but far more often he turns a blooming countryside into a hopeless desert by sheer greed and destructiveness." He notes the ethical dictum, "Thou shalt not kill" but confesses that "so long as we condone the wholesale destruction of human life by dropping bombs from aeroplanes

and the wholesale destruction of animal life for fun or 'sport' we cannot be said to adhere to this ethical dictum with any real tenacity." He reaches the conclusion that, "If in the ordering of nature, life on Earth was destined to flourish and to multiply, to unfold its forms and increase its variety, it must be recognized as a tragic failure of its destiny. . . . So far, it has merely achieved the emergence of the arch-destroyer of life and of the sources of food and shelter necessary for its maintenance."

This surely seems pessimistic, yet surely, also, it is a pessimism expressed with hope, a hope implied in the words "so far," a hope implicit likewise in the very expression of the pessimism.

Samuel Ordway's cry in *Resources and The American Dream* for the "adjustment of man to nature" is hopeful, without doubt—explicitly hopeful—for, as he poses his searching questions, he quickly adds: "If these questions can be resolved it should be possible to direct thought and action along channels which will forestall possible cataclysm, and help achieve the balanced civilization we truly desire."

Mr. Ordway's questions are about the resources needed to support an ever higher level of living for more and more people, about prophets of doom and optimistic scientists, about the limits to economic and industrial growth, and, above all, about "the spiritual values of our material faith in economic progress, and the spiritual consequences of possible collapse of this, our cherished faith and dream."

He thus sets out to analyze our almost universal modern goal of creating an ever higher level of material living for all mankind, our deep faith in the progress which means "more and better food, clothing and housing, better health and longer life, greater leisure (often confused with the idea of freedom), and more security, accompanied, of course, by less physical effort." This, "our great inspiration," he warns, "may turn out to be our great illusion."

In two concise chapters Mr. Ordway exposes "our current fantastic consumption of raw materials" and the fond faith "that earth and sea and atmosphere can deliver to the ingenuity of man, as he becomes ever more skilled, an unending, inexhaustible supply of raw materials."

Mountain Range

By DANIEL SMYTHE

Seventeen mountains in a row
Mirrored their heads in the lake below.
Chocorua and Washington
Held up their peaks of silent stone.
Between their valleys dark and high,
A mist was going to the sky;
This was a caucus, to be sure,
To vote if bases were secure.
The mammoth heads looked down, looked down
Upon the tiny lights of town
Where eyes stared up, surprised to see
The outlines of eternity.

Then he proposes the theory "that there is a probable limit to continuous growth and ever higher levels of living for more people" and states in brief the whole purpose of his volume, as follows:

"When that limit is reached, if we are not philosophically and spiritually prepared for a major transition in our way of life, thought, and economic faith, the consequences will create a spiritual as well as an economic upheaval that may well produce stagnation and decay. If we are prepared for it, if we accept in advance the fact that higher values in life are not material; that the Good Life is dependent on spiritual freedom and self-sufficiency as much as on new motor cars, more modern washing machines, on luxury and leisure (truths forgotten in our great prosperity), we can ease the transition."

Convinced, therefore, that "it is important to prepare now," Mr. Ordway goes on to a fervent and searching deep, brief essay on "The Good Life," complaining that "ever higher levels of living have reduced man's capacity to live simply on the land," and concluding:

"That is the essence of our problem in America today. We need to prepare now—to change our present way of thought, abandon as our goal an ever higher level of living, renounce gadgetry, and prepare ourselves and our children to create rather than use up; nurture our soil, our forests, our water supplies, our independence and our self-dependence; and thus win back the security of life which exists where men are working with nature to produce more than they consume."

This book certainly has a deep meaning for all of us. Its chapter on "The Good Life" should be read aloud throughout the country. Its prudent counsel to adjust our consuming to our resources should be heeded, and its hopefulness should give us courage and faith. "A tightening of the belt, yes. A revision of our goals, yes. But human disaster, no—not inevitable." And indeed, yes, "material values are not primary values."

Pondering the e two small volumes—small but perhaps fissionable—one is inspired anew to regard Life as a central concern, to aspire to a sound and thus harmonious relationship with so much of life as one can find compatible, to seek the Good Life in the satisfactions that are beneficent, in the self-realizations that can also be a recognition of one's self as a part of the great community of Life, to know that there can never be a limit to the growth of the soul of man or to the spiritual richness of his culture—if his appraisal of material values is sound, if his ethics inspire his prudence, if he remembers the profound assertion in Jesus' searching question: "What shall it profit a man if he shall gain the whole world and lose his own soul, or what shall a man give in exchange for his soul?"

Resources and The American Dream,

Including a Theory of the Limit of Growth. By Samuel H. Ordway, Jr. New York: The Ronald Press Co. (15 East 26th Street.) 1953. 55 pp. (4-1/2 by 7-1/4 in.), with 5 text figures. \$2.

Trends of Life. By F. Wood Jones, F.R.S. London: Edward Arnold & Co. (In New York at St. Martin's Press, 103 Park Ave.) 1953. 191 pp. (5 by 7-3/4 in.), with index. \$2.50

Lives of Wild Birds

The Lives of Wild Birds. By Aretas A. Saunders. New York. 1954. Doubleday and Co. 256 pages. Illustrated by Dominick D'Ostilio. \$3.50.

Ornithology is not exclusively the collecting, describing and measuring of bird specimens, contends this author, but "the goal of ornithology is to be reached by the study of the living bird, not the dead one." The study of a live bird that is not in hand need not be inexact and therefore unscientific, he asserts, and the study of dead birds has only laid the foundation for the study of live birds. Thus the science of ornithology in America is far from complete; indeed, it has only just begun. This excellent book, then, is designed to aid the student and observer of the living wild bird; to guide him in knowing that which is significant and important and in applying the measurement of science to what he has seen and recorded. This approach, it seems to us, make Mr. Saunders' book an extremely valuable one and a special contribution to ornithological writing.

Mammals

The Natural History of Mammals. By Francois Bourlière. New York. 1954. Alfred A. Knopf. 363 pages and index. Illustrated. \$5.00.

Within the covers of this book the author has brought together a vast amount of information amassed by field and laboratory mammalogists on the ways of life of mammals the world over. His text is written against a background of the relationship of mammal life to its environment. In fact, this book is a sort of guide to mammal-watching, makes the fashion of guides to bird-watching.

British Funguses

Mushrooms and Toadstools. By John Ramsbottom. New York. 1953. The Macmillan Company. 306 pages. With 84 color photographs and 58 black and white photographs. \$6.25.

Since the close of World War II, the author says, the British public appears to have become fungus conscious. Events conspired to bring funguses, from mushrooms to dry rot, to public attention. Most famous fungus, of course, has been *Penicillium notatum*. Dr. Ramsbottom, noted British botanist, confines himself, however, to the mushrooms and toadstools in this beautifully illustrated, important volume.



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The Woodmont Story. By Henry P. Bridges. New York. 1954. A. S. Barnes and Company. 209 pages. Illustrated. \$10.00. This is the story of hunting, fishing and raising wild turkeys at the Woodmont Rod and Gun Club of Hancock, Maryland.

Dinosaurs. By Herbert S. Zim. New York. 1954. William Morrow and Co. 64 pages. Illustrated by James Gordon Irving. \$2.00. A Morrow Junior Book telling effectively in text and picture the story of the dinosaurs.

Great Systems of Yoga. By Ernest Wood. New York. 1954. Philosophical Library. 168 pages. \$3.50. Discussion of the systems of Yoga by one who spent thirty-eight years in India.

Greenhead. By Louis Darling. New York. 1954. William Morrow and Co. 95 pages. Illustrated by the author. \$3.00. A Morrow Junior Book telling the story of the mallard duck and its life, north and south.

The Book of Arts and Crafts. By Marguerite Ickis and Reba Selden Esh. New York. 1954. Association Press. 275 pages. Illustrated. \$4.95. A book for handicrafters of all ages, with practical information and instruction on the arts and crafts.

History of the Theories of Aether and Electricity. By Sir Edmund Whittaker. New York. 1954. Philosophical Library. 319 pages. \$8.75. Highly technical work on the evolution of physics for the physicist.

Men of Earth. By Eleanor S. Warner. New York. 1953. Vantage Press. \$2.00. A charming book of outdoor verse with a delightful historical-autobiographical introduction concerning earlier days in Wisconsin.

Intertidal Invertebrates of the Central California Coast. Berkeley, California. 1954. University of California Press. 446 pages. Illustrated. \$5.00. S. F. Light's *Laboratory and Field Text in Invertebrate Zoology* revised by Ralph I. Smith, Frank A. Pitelka, Donald P. Abbott and Frances M. Weesner. An important volume for the professional zoologist and the advanced student.

Crocodile Fever. By Lawrence Earl. New York. 1954. Alfred A. Knopf. 293 pages. Illustrated. \$3.95. The story of African adventure by Bryan Dempster, as told to this author.

For Fly Fishermen

The Practical Fly Fisherman. By A. J. McClane. New York. 1953. Prentice-Hall. 257 pages. Five color plates of different flies. \$5.95.

Here is a book that will delight those who follow the art of fly fishing. The author is a fisherman of wide experience and is fishing editor of *Field and Stream*. He has packed a great deal of practical information and advice into his readable and well-arranged text.

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Products and Such

No larger than a package of cigarettes is an emergency life preserver called Res-Q-Pak. It inflates with a squeeze of the hand, and will support a 250-pound man in the water. Information from Fayette Copeland, Jr., The Perrett Company, 816 W. Fifth Street, Los Angeles 17, California.

Richardson Rod and Reel Co., 3150 N. Sawyer Ave., Chicago 18, Illinois, announces a new #400 "Telecaster" telescopic bait casting rod. It fits into a tackle box, brief case or automobile glove compartment.

To take the guesswork out of parallel automobile parking, Richard Whitehill and Co., 6007 Euclid Avenue, Cleveland, Ohio, has devised a new dashboard gadget called "Autoparker." It tells you just when to turn the wheels, which ought to be worth the dollar they ask for it.

"Tiny-Tell" is the imaginative name given to a little, precision-made telescope. It is seven-eighths of an inch in diameter and two inches long. It is announced by United Binocular Company, 9043 S. Western Avenue, Chicago 20, Illinois. Retail, postpaid, for \$3.95. We have not used it ourselves.

The 111-year-old Mann Edge Tool Company of Lewistown, Pa., announces a totally new kind of gardening tool called "RapiDigger," combining in one instrument the functions of hoe, trowel, pick, hand-axe and small spade. Useful in weeding, root cutting, aerating the soil, hoeing, edging, root feeding and planting. It sounds terrific, but we have not seen it ourselves.

Precision Equipment Co., 3720 Milwaukee Ave., Chicago 41, Illinois, claim that their "Stroke-O-Matic" kit will take strokes off your golf handicap by providing you with practice opportunity in your own back yard. Costs \$9.9. Wonder what it would do for our seven handicap?

Buckeye Bait Corporation, 207 S. Third Street, Miamisburg, Ohio, is proud of its Buckeye Double Snap-on Plastic Bobber, with two hooks for engaging the line. There are five different diameters. Charlie Cowsert at Buckeye will be glad to tell you more.

"Grow Power Planter Mix" is a cross between a compost-base organic fertilizer and a potting soil, according to its joint distributors, American Brand Fertilizer Company of Hobart, Indiana, and Benson-Maclean, Bridgeton, Indiana. It is energized with Activo, a bacteria, biotic-enzyme composition manufactured by the latter firm.

Earl Products Co., Laning Street, Southington, Conn., announces a miniature Bantam Weathervane, attractive and for a variety of uses, indoors and out. Sells for \$1.50.

Ten new KAMPKOLD portable refrigerators in a variety of sizes and colors have been brought out by the American Gas Machine Company, 505 Front Street,

Albert Lea, Minnesota, in the "Scotsman" line. Full information from them.

A new, four-color catalog of baits has just come from the printer to Fred Arbogast Company, 311 West North Street, Akron 3, Ohio, and will be sent on request.

Weighing only one pound, a seven-piece camping kitchen consisting of a brass alcohol burning stove, two deep aluminum pots and an aluminum frying pan, and two detachable and interchangeable handles and leather carrying strap is announced by United Products Co., 9043 S. Western Avenue, Chicago 20, Illinois. Sells for \$7.95, prepaid.

Our Wildlife Legacy

Our Wildlife Legacy. By Durward L. Allen. New York. 1954. Funk and Wagnalls Company, 422 pages. Illustrated. \$5.00.

"Our renewable resources will be renewed only if we understand their requirements and plan it that way," declares Durward Allen in this immensely interesting and informing book. Although many volumes have been added to the book shelf under the title of "conservation" since Aldo Leopold first wrote about this subject with charm, fact and persuasion, we do not recall one that has approximated Leopold's mastery of these attributes of conservation writing. Now comes Dr. Allen to write superlatively and dramatically about our wildlife resources.

It is a happy circumstance that the author should choose the story of the bison as an introduction, for he had done what we did not think possible—written better about an often-written-about subject. Thus he captures the reader's interest and then never lets him down. The examples he has chosen to illustrate relationships of animals to their environment are intriguing ones, and these lead logically to an always interesting and many times startling discussion of these relationships.

"The natural productivity of living things," Dr. Allen points out, "is almost beyond belief—when certain key conditions are in proper adjustment. It appears that our logical job in wildlife management is to determine what those conditions are for each species in each type of range and then learn to control them. In fact this probably is the only way, as applied to game and fish, to get what we want on the scale we must have."

After having established "that animal populations have an innate tendency to expand and that environments contain this force at high or low levels depending on whether they are favorable or unfavorable," the author proceeds to discuss what he calls "The Management Strategy," and a multitude of aspects of the man-animal-environment relationship.

"What we have now," says the author, looking backward, "is largely a matter of chance; but what we are to have

cannot be left to chance. It calls for understanding and design. The wildlife resource must be studied because we did not make the rules of the game and we are only beginning to know what the rules are. . . Of late, we are getting down more to the source of things. Nature, we have found, is a whimsical wench. But even her whimsy will be predictable—when we know enough."

Durward Allen has given us a book that should, of course, be required reading for every student of wildlife management. But, far more than that, he has written a book that should be read by one and all who have any interest in the present and future of our wildlife populations. R.W.W.

Indian Artifacts

Indian Artifacts. By Virgil Y. Russell. Casper, Wyoming. 1953. Published by the author, 1342 S. Popular Street. 140 pages. Illustrated. \$3.50.

This is an extremely helpful reference and identification book for anyone collecting or studying the stone artifacts made by the Indians. It instructs as to how to hunt for these items and how to present them and classify them when specimens are added to one's collection. The author writes for the average collector and against a long and varied background of collecting activity and experience. Mr. Russell feels that the serious student of these artifacts will graduate from this comprehensive introductory text to the writings of the archaeologists. Sixty different artifacts found in the United States are described, classified and illustrated.

A Home Museum

How to Make a Home Nature Museum. By Vinson Brown. Boston. 1954. Little, Brown and Company. 214 pages. Illustrated by Don Greame Kelley. \$2.50.

Although this book would appear directed primarily to the one who wishes to set up an orderly home museum of natural history subjects, it seems to us that it is equally useful to the camp director, youth group leader and others who may have occasion to establish a modest museum collection. This is a most practical book, dealing with the preparation, mounting, labelling and other details of the display of collections. An excellent bibliography is supplied.

Parrakeets

Budgies. By Cyril H. Rogers. New York. 1953. Dover Publications. 93 pages. Illustrated. Sixty-five cents.

This is the latest addition to the growing literature about shell parrakeets and their care and breeding. It reflects the phenomenal growth in the interest in these birds as pets. Special emphasis is placed on color breeding, so this book is of interest both to the breeder and to those who wish to give their birds the best of care.

Contents Noted

STILL the pressure upon our wild animal population in the category of "game" continues to climb. The fiscal year of 1953 recorded an increase of almost a million in the number of licensed gunners, for a total of 14,832,779. This produced a gross revenue to the States of \$40,551,316, and untold and unknown amounts to the manufacturers of arms and ammunition. Despite frantic efforts to provide adequate habitat for game birds and mammals, and despite wildlife management programs to foster maximum production of what many like to call the "wildlife crop," we cannot but feel that the pressures are outstripping anything that man can do to keep abreast of them. Fishing licenses, too, climbed about a half-million, to 17,652,478.

WHILE on the subject of statistics, it is worthy of record that the National Park Service announces that 46,224,794 people visited the areas under its administration during the calendar year of 1953. This represents an increase of nearly four million compared with 1952. Of this total 17,372,280 visited the National Parks. Even allowing for considerable duplication, and the rather inflated figures from three of the parks which are really centered around main highways, that figure represents a lot of people. However, the appropriations of the National Park Service funds still lag far behind even minimum amounts needed to provide the facilities and personnel adequate to handling this horde of visitors.

HARKING back to the matter of gunning pressures, we would like to make a matter of record here a prediction about which we hope we are wrong. Recently there has been quite a bit of publicity condemning the seagull, particularly the herring gull. Its numbers are said to have increased in many places to the point that it is a nuisance, a menace to fishermen and to other birds, and a cause of varied crop damage. The herring gull is protected under the Migratory Bird Treaty. Some ornithologists defend the bird as a scavenger. If the herring gull needs control, and this need can be established on sound scientific fact, then, no doubt, it should be applied where necessary. However, we hope that we are wrong in reading between the lines of this recent and considerable anti-gull publicity a start toward a movement to open up the shooting of our shore birds, which are gradually coming back after years of protection. The declining number of wild bird targets and the steadily growing number of gunners suggest that the reading matter between the lines is becoming less and less faint.

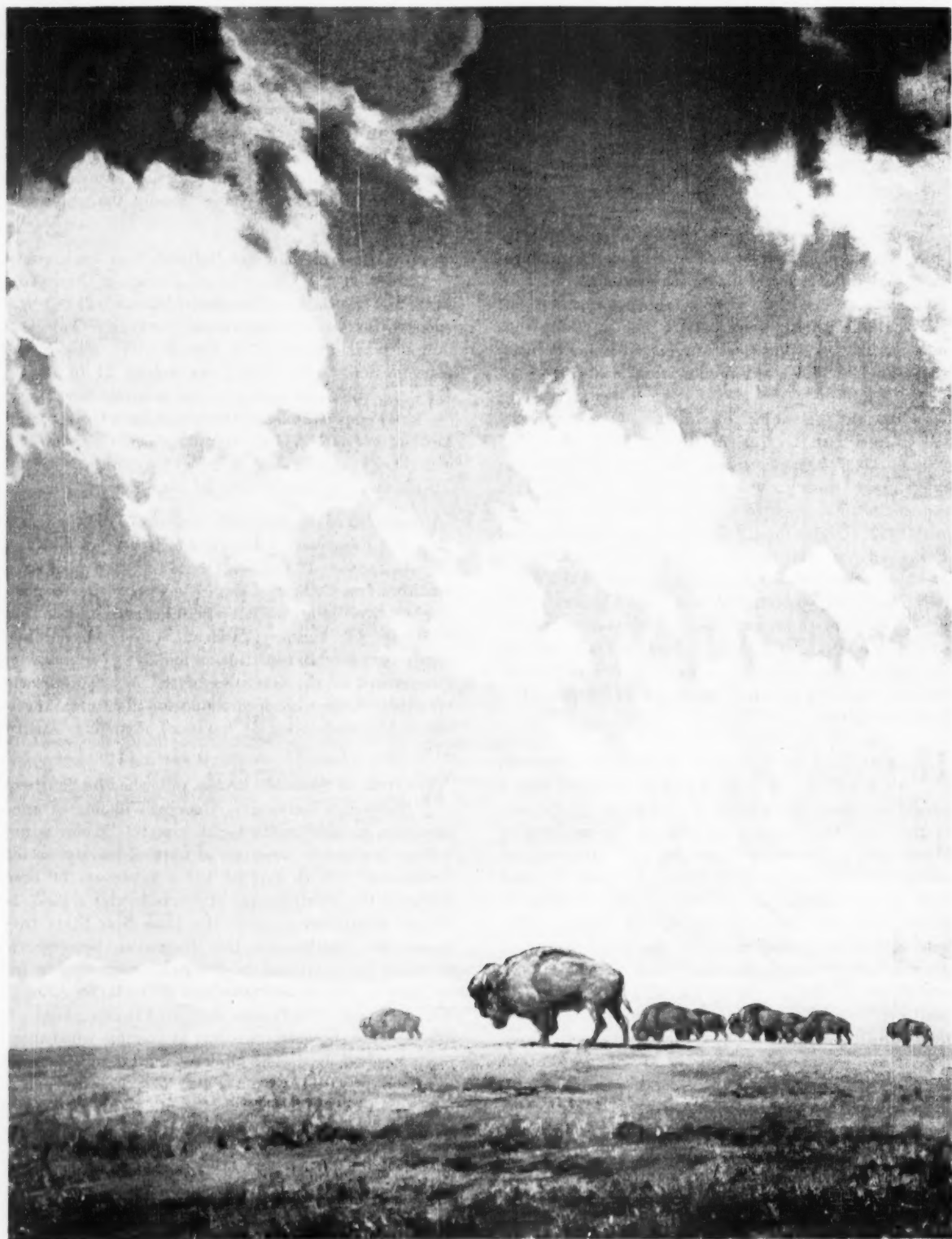
OUR salute to the Michigan Audubon Society, which this year is celebrating its golden anniversary. Its fiftieth annual meeting was held in Detroit in late

January. During the past five decades the society has made notable contributions to the knowledge of bird life in Michigan. It has been in the forefront in the field of conservation in that State, which ranks with the best in its conservation program, policies and administration. However, as Edward M. Brigham, Jr., president of the society, says, there is still much to do and "the future holds tremendous possibilities for worthwhile activities in the study and enjoyment and protection of birds and more broadly the whole out-of-doors."

FROM Mabel H. James of Holland, New York, comes word that the Conservation Forum of New York State and the Buffalo Museum of Science will this year sponsor its sixth Conservation Caravan. This is a unique traveling school of Nature study, ecology and conservation. This year, from August 21 to 28, the Caravan will tour western and central New York, western Pennsylvania and the Muskingum Conservancy District in Ohio. Hawk Mountain Sanctuary and the sanctuary at Pymatuning Reservoir are on the itinerary. This is an experience worthy of your inquiry.

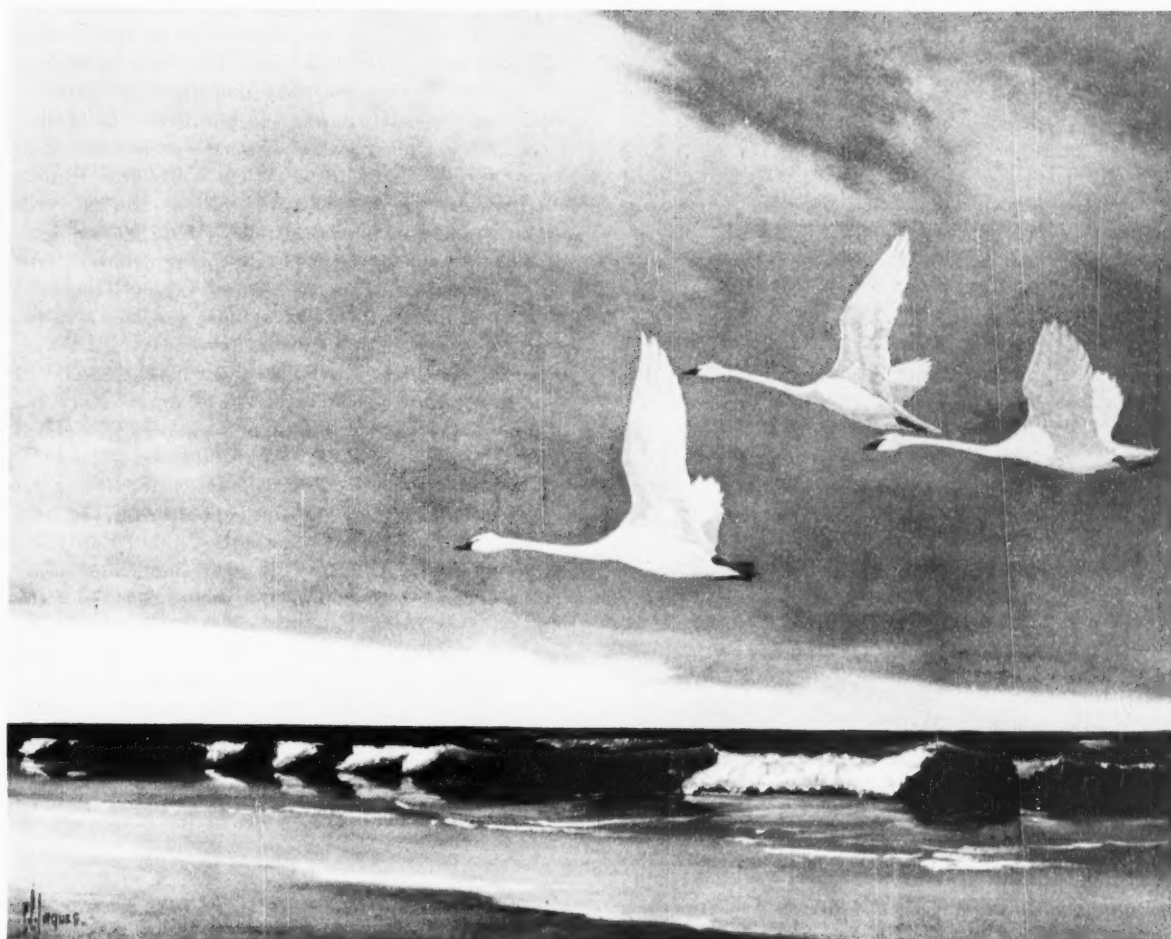
A MEETING of the Board of Directors of the Conservation Education Association was held in Chicago, Illinois, January 18 and 19. Dr. A. G. Peterson of Eastern Montana College of Education presided. Reports were received on membership building activities; public relations; bibliography; and on State-level coordination programs. A constitution and set of by-laws for government of the activities of the Association were adopted. Plans were formulated for the annual meeting of the Association at Laramie, Wyoming, August 21 to 25.

WRITING in *Southwest Review*, published by Southern Methodist University, George Williams of Rice Institute, an able ornithologist, asserts: "There is not a first-class public museum of natural history in the Southwest." With typical Texas tendency, he then discusses the shortcomings of Texas in this regard, as though when you mention the Lone Star State that means the Southwest. His discussion, however, is much to the point and is extremely interesting in his estimate of the aims of museums in the larger cities of Texas. These, he says seem dedicated to being as much like old-type, big-city museums as possible when there really needs to be a more modern and dynamic concept of the natural history museum. We heartily agree, but before Mr. Williams writes off the whole Southwest we hope he will have a chance to visit the Arizona-Sonora Desert Museum, sponsored by the American Nature Association, near Tucson. This may be only a start toward providing a dynamic southwestern natural history center, but it has come a long way in a short time, as the more than one hundred thousand visitors to the Museum testify. Drop in some time, George, and let Bill Carr or Bill Woodin show you what they are doing.
—R.W.W.



"MOUNTAINS ACROSS THE PLAIN"

A study of the bison
by Frances Lee Jaques



Whistling Swans

With Paintbrush, from Easter Island to the Yukon

By LUCY EMBURY

With reproductions of paintings by Francis Lee Jaques

FRANCIS Lee Jaques was born in "the land of Lincoln" as we like to call the State of Illinois—a region of wide spaces and rivers of great original beauty; a land of little lakes. At the age of eleven he left the town of Geneseo, his birthplace, to live and labor for fifteen years on a farm.

Beyond his father's fields the little lakes lay, still haunted by wild fowl, as in Marquette's day. History haunted the region, too, and memories of high-hearted men. The wide sky held its own enchantment and the flat earth was richer because brave feet had pressed it. The boy, Lee, felt these things, although not prone to speak of them. He lived too close to the seasons, to the eternal realities, to be garrulous. A pencil talked

truer than a tongue, he early decided. Nobody taught him to draw. He just began, when a small shaver, to tell truth with a piece of chalk on a blackboard, to show the shape of a duck's foot or of a cloud sitting on the horizon. His sensitive eye saw many things other eyes did not see.

Francis Lee Jaques never had much by way of formal instruction. It was Mother Earth who, day by day, gave him lessons in the power of labor, honesty, and love. She worked without fanfare, performing endless marvels—a flaring poppy from an infinitesimal dry seed; a gold-winged oriole from a brittle, pale-pink egg; a silvery perch leaping from spawn among the reeds. Life-beauty was her work's reward. With



The Jaques Afield

wonder young Lee watched and acquired Earth's art of patience, silence, self-discipline. A sure hand on a plough created a straight furrow. A sure hand on a pencil created living lines. These two things were really true.

On off hours, after farm chores were done, Lee was free to draw and dream. He would explore the nearby lakes in his rowboat. His forebears had loved water; to explore was in his blood. Louis Jaques, the first to come out to the New World about 1700, had sailed his own ship across the Atlantic. Louis' descendants found the seaboard stuffy, so pushed westward by waterway to "the heart of America," to the prairie-river region long prized by sons of France. Illinois offered independence and space; the whole area had only 12,282 inhabitants in 1810. After it became a State in 1818, it filled rapidly. By 1850 its population was up to 851,470, among which were only 707 paupers. Thus Illinois, as with all America, was built by work and courage.

Courage and work are Francis Lee

Jaques' heritage, and to this heritage he is faithful. It has never occurred to him that art is an ivory tower affair, an amusement apart from life. Yet he did not plan to become an artist. Painting was just a pastime, a natural necessity during his youth on the Illinois farm. He has played a man's part; has met the challenges of today foursquare. When World War I broke out he worked in the shipyards. Afterward, for three years, he did commercial art. Not until 1924 did his career as an artist actually begin through contact with the American Museum of Natural History, the Bird Hall of which stands as permanent testimony to his skill. Here for the first time he met and moved among men who cared for the wildlife of our land, and labored to preserve it. Now all his seasons of observation came into play, flowing from the tip of his honest, disciplined brush.

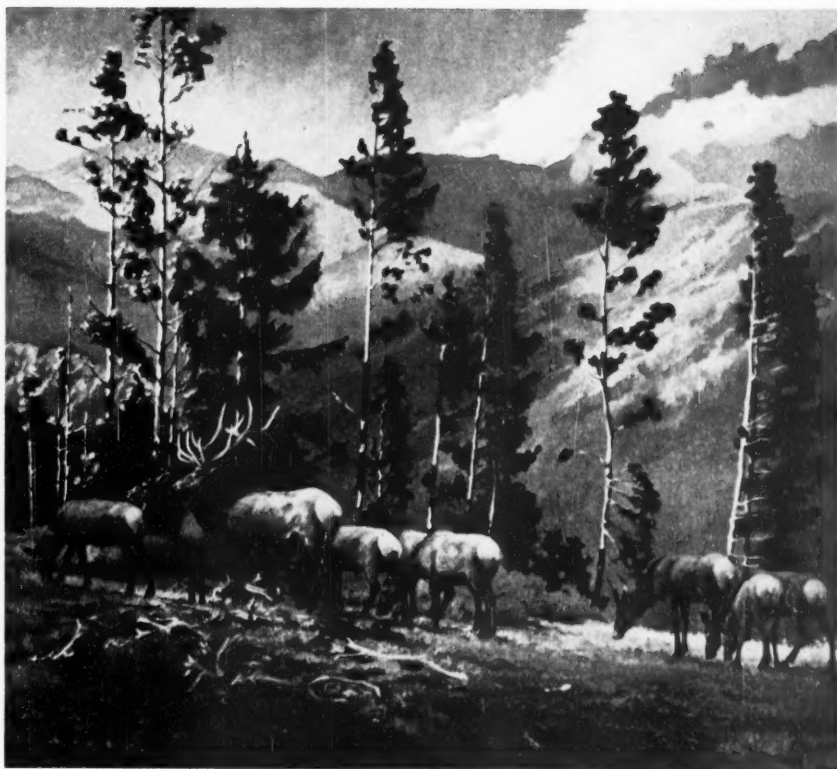
The years since 1924 have been years of fruitful travel and much practice with the paintbrush. In 1928 Jaques saw the Arctic Ocean with Captain Bob Bartlett—a great team! The year 1934 found him sailing in the opposite direction on the yacht, *Zaca*, with the Crocker Expedition, headed for South Pacific Islands. "*Zaca*" is an Indian term for "Peace." Christmas Eve found the *Zaca* anchored off Pitcairn Island and the Islanders came out and sang hymns around the ship. Strange it seemed, and moving, to hear the familiar festal songs in that faraway spot! The present-day

The ZACA at Rurutu



Pitcairners are descendants of English mutineers of H.M.S. *Bounty* and Polynesian women. Cruising among the Austral Islands, Jaques saw rare little reef herons, white and dark blue-gray, mincing on slender legs along the surf-edges that break and foam upon the coral. On remote Rurutu, one of the Austral Islands where mail comes but once a month, it was surprising to discover frame houses "with gingerbread trimmings like the kind you sometimes find in New England," as Jaques put it. Off Rurutu the evening became suddenly dramatic. Native canoes drove out beyond the reef, rode the swells, fired bundles of palm-fronds and netted flying fishes attracted by these primitive flares.

Drama is everywhere in Nature. The majestic march



American Elk

Reef Herons in Rurutu Surf



of woodland caribou across the pathless Gaspé mountains; the troops of shy, white-rumped elk in the Rockies; the startling gold of Colorado cottonwoods against brilliant autumn blue; the arrowy, mysterious flight of swans along the Virginia coast; the proud-headed Canada geese swooping down to feed upon winter wheat on their way southward from Hudson's Bay to some Mississippi bayou—all these have been caught and recorded by Francis Lee Jaques' perceptive eye and brush. Once, when his much-traveled helpmate mentioned missing a garden of her own, her husband answered: "All of North America is our backyard." This is literally true. Together the Jaques have traveled widely over these United States, and much of Canada. Canyons and coasts, rain forests and snow peaks have been



Canada Geese in the Winter Wheat

their fare for a long time. A nourishing, bountiful fare, shared with the rest of us in a half dozen books with wild and lovely titles like *Birds Across the Sky*, *Canadian Spring*, and *Snowshoe Country*, which was awarded the John Burroughs medal for 1916. Florence Page Jaques paints with words instead of pigments—gay and courageous words. She builds life on belief.

"The contemporary attitude toward existence—that insistence that life is a sordid and hopeless affair—has cowardice about it; there should be exhilaration in living, even in peril . . . I cannot think of a single flower, no matter what a struggle it is having to survive, which looks terrified or brutal or spiteful or sly. This candor and gaiety cannot fail to lift our hearts." These are from the Jaques' book, *As Far as the Yukon*.

Humor they both have and a sound joy, which has

resulted in consistent productivity. Since 1924 the canvases of Francis Lee Jaques have been known and increasingly prized by Nature enthusiasts. Today he ranks among top-flight painters of our great outdoors. "Black Ducks on a Minnesota Rice Lake," his first serious picture, was bought by Irvin Cobb, the American humorist. Since he began his steady ascent in 1924, Jaques' work has been shown at the Carnegie Institute, the National Academy, the Cranbrook Institute of Science, Audubon House, and other galleries. Color presentations of his wildfowl have appeared in many publications, as well as appreciations of his contribution to the general field of wildlife painting by naturalists qualified to judge. Thus, in a quiet way, success has come to this quiet man, a solid success rooted in sincerity and industry and a deep love of Nature.

Theme Song for April

Small frog, so lately sponsored, newly dressed,
I can forgive your most vociferous racket;

By VELMA FEHLING

You advertise a slicker, and a vest
That doubles for a shirt and dinner jacket.



Operation Avocet

By JAMES FISHER

Photographs by Eric Hosking

ALONG the northern parts of Holland runs a chain of low, sandy, marshy islands. Some of them have little villages with farms and fields; others are rather small, plain wildernesses; others are mixtures of farms and wilderness. Ever since anybody can remember, rare marsh birds have nested on these islands, and the Dutch people, who are fond of birds, have protected them. Among the birds that nest on these marshes are herring gulls, many black-headed gulls, and several species of terns. But perhaps the most beautiful of all are the pied avocets, with their extraordinary upward-tilting bills and their long, lead-blue legs. The Dutch call them *kluits*, because "kluit" is the noise they make. The European avocet's body is mostly white, with a bold black pattern. The whole of the top of its head and the back of its neck are black, whereas the head and neck of the American avocet are cinnamon pink in summer.

The British Isles lack such wonderful bird marshes as Holland, although in the east of England there have always been many boggy places near the coast, especially in Lincolnshire, Norfolk, Suffolk, and Essex. As with the Dutch, the English of East Anglia have built sea walls, and drained many of the marshes for agriculture; but they have not been able to drain all.

Nobody knows exactly why the avocet stopped nesting in Britain more than one hundred years ago. Some think it was because of the invention of the modern shotgun. It is certainly true that about a hundred years ago guns were regarded as wonderful new toys, and some people popped off at almost anything that moved. Others avidly collected birds' eggs, and made a special effort to get the rarities. Whatever the cause, the avocet stopped breeding in Norfolk, then in Lincolnshire, and finally in Kent. This marked the end of its nesting in England—Kent apparently was the last county in which the bird nested, about 1843, although there are still large areas of suitable marshes in that county. After 1843 the avocet became only an occasional visitor, calling at some of its old marsh breeding haunts on spring and autumn migratory flights. Some of the birds tried to nest in Suffolk about 1880, but nothing came of it. By the time that most of our fathers and grandfathers went bird-watching the avocet was a forgotten species so far as personal acquaintance in Britain went.

However, in 1938, an extraordinary thing happened. Two pairs of avocets nested within a few yards of each other in a marshy place on the coast of Ireland. This was all the more extraordinary because avocets had



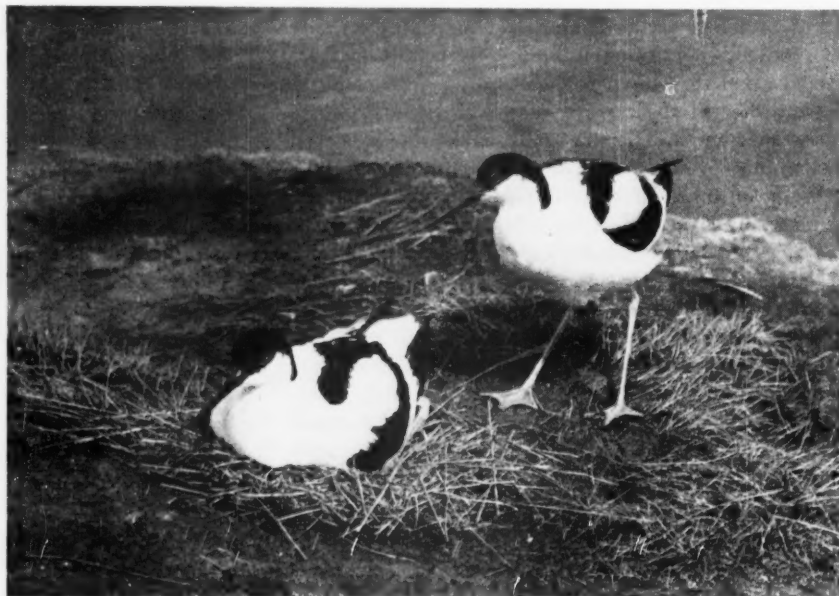
The avocet puts on its display that is intended to distract one from the nest area.

never before been recorded as nesting in Ireland. It certainly meant that something was happening in the avocet world. Indeed, about then our Dutch friends noticed a distinct increase in the number of avocets nesting in the sanctuaries in Holland.

Then, in 1944, an avocet was seen with baby chicks in Essex. In 1946 a pair laid eggs in Norfolk, but the eggs disappeared when a well-known egg collector was seen in the neighborhood. Then, in May, 1947, Brigadier Stanford discovered three avocets' nests in the bird sanctuary of Minsmere in northeast Suffolk. A close watch on the nests was immediately organized by Captain S. Ogilvie, the owner of the estate. Long watches can be tedious, but they certainly made the avocets quite safe that year. Eventually there were four breeding pairs at Minsmere. In the same year another colony of avocets was discovered at Havergate Island, a large, flat, gravelly place in the river Ore below Orford. Here four or five nests were made in 1947; and that year eight young were reared at both Havergate and Minsmere.

To ornithologists all over England, Wales and Scotland, it was obvious that something new was happening. The

nesting in that year—1948—was given up until, towards the end of April, the birds all arrived safely at Havergate Island. They had abandoned Minsmere. The Havergate colony really thrived, and a little colony was founded at another place on the coast. The band of watchers in their tent at Havergate soon discovered five pairs, sitting on nineteen eggs. And then, in the middle of May, came disaster. Through various circumstances the number of eggs had been reduced from nineteen to thirteen, and then, in three nights, rats destroyed no less than eight. Five were left to hatch, and only three chicks finally flew at Havergate. Fortunately, ten chicks were reared at the other place; so,



Waiting for the change of shift on the nest. The male bird is waiting to take over.

In protection of its nest and eggs the sitting avocet puts on a display of aggression.

with thirteen young ones safely produced, England had not done so badly—but had not done well enough!

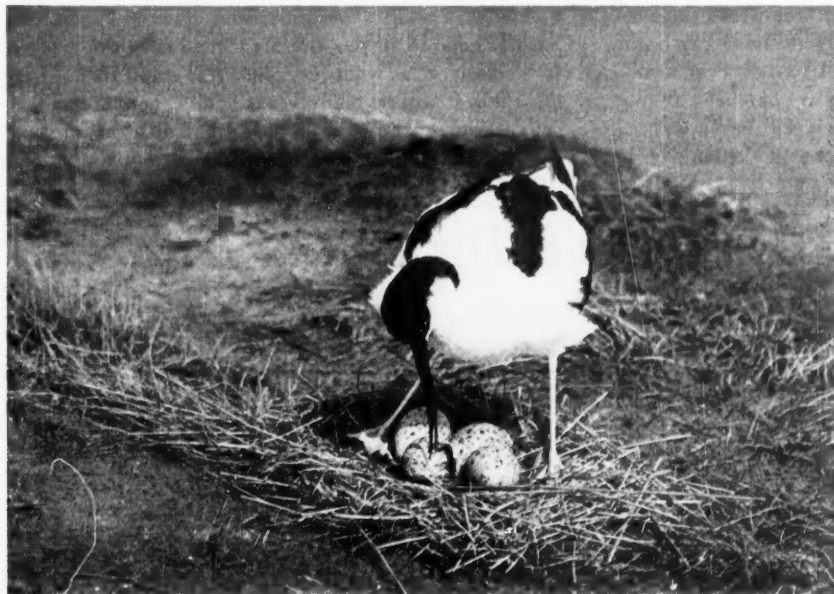
By 1949 conditions seemed difficult. The second breeding place of 1948 was partly drained, and the birds had given up Minsmere altogether. The Royal Society for the Protection of Birds saw that it was going to have all its eggs in one basket, or at least on one island. Therefore it took a bold but quite calculated risk. It bought Havergate Island, and it also got the help of the Infestation Control Division of the Ministry of Agriculture to deal with the rats.

The avocets now had an island all their own; the Bird Protection Society had bought it for them, and there were no rats to contend with. All seemed well, until, in early March, 1949, (not long before the birds were expected back) the sea walls of Havergate Island, which had kept conditions exactly right for the avocets, were breached in several places by high tides and winds. From dawn till dusk the Society strove to repair the breaches in the wall, mostly by hand, because it was not possible to get machines to the island in time. It seemed impossible to drain the flooded island. But,



just in time for the avocets, the water level came down to the right depth, and the birds took up their nesting station. Seventeen pairs made nests, and a grand total of at least thirty-one young birds were reared. The R.S.P.B. was not going to be caught napping again. During the next winter they spent no less than £3500 (nearly \$10,000) in building one entirely new sea wall and rebuilding the others. New sluices were made so that the level of the water could be controlled within an inch! The avocets arrived as usual, and in 1950 twenty-one pairs nested and reared some forty young. Since then each year has revealed a steady increase.

My second visit to the avocet island was a great contrast to my first. The first time I went there was when the colony was struggling to establish itself. In fact, I arrived on the evening just before the rats started their destructive work. Philip Brown and his helpers were camping in little tents, and whenever they wanted to see the avocets they had to crawl along behind one of the walls to a hastily rigged peep-hole, through which only one observer could look at a time. On my second visit, after the new wall had been built, everything was different. The watchers lived in



A youngster about to emerge from the egg and the parent birds assist in this process.

Havergate Island, Suffolk, England, where the avocets have returned to nest in Britain.

a comfortable hut. In the new wall, at strategic places, observation posts had been built and roofed over. There were large observation posts in which half a dozen people could sit at a time. There was a bench to sit on, and flaps in front to look through. The new blinds were very similar to the blinds that Peter Scott has built into the sea wall at his wild goose grounds in Gloucestershire, where thousands of people have watched geese in comfort.

So there we were, on a warm day in late April, watching avocets and eating our sandwiches. The avocets were only fifty yards away, quietly going about their business, calling to each other, courting and displaying. Birds sitting on their eggs were quite conspicuous; the avocet does not attempt to conceal itself on its nest, but relies on the presence of its companions and its general aggressiveness to keep enemies away.

It was interesting to watch the avocets feeding in the rivulets on the flat marsh. They would walk up one of these waterways, wading in water six inches deep, and sweeping their heads from side to side with the up-curved ends of their beaks just under the surface. Sometimes the females bowed while wading in the water near the males, so that their bills lay along the surface of the water with the upcurved end poking slightly upwards. They looked extremely odd.

It is not easy to tell males from the females, except by this bit of behavior. When they have settled down to incubating the eggs (there are usually four in a nest) they usually change places about once every hour. The males seem to do as much sitting on the eggs as the females. After a little more than three weeks the eggs hatch, and it is not many hours before the chicks begin to run about with their parents. All avocets can swim, even within a few hours after they are hatched. While the parents are looking after the chicks they are fierce and aggressive, and "see off" all hostile-looking birds



or other intruders. If human beings come near them at this time, the parents try to distract attention by flying clumsily at them, or by floundering along the ground with wings drooping, seeking to give the impression that they are injured.

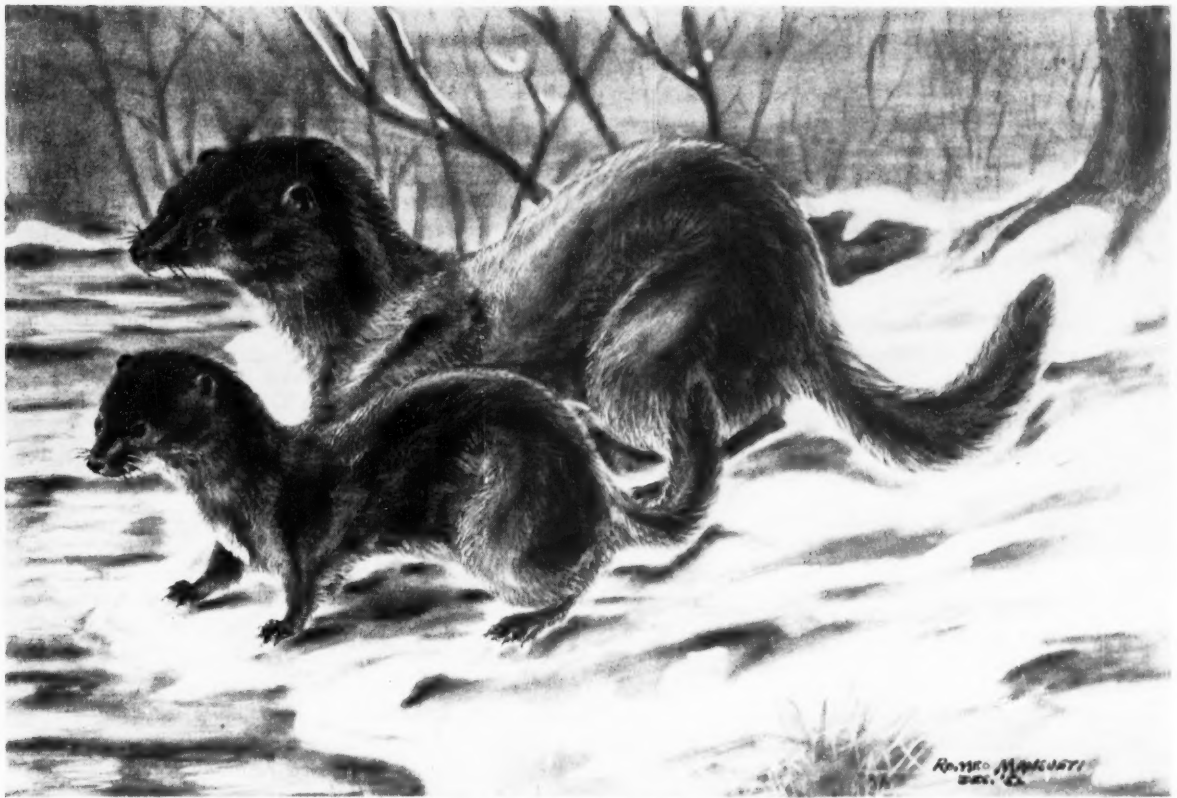
It is marvellous to watch these rare birds at Havergate Island. That they have come to a safe place where they are in no danger of being robbed or ill-treated is largely due to the Royal Society for the Protection of Birds. But everybody likes avocets and is glad to have them back again. No one wants to interfere with them—except a few collectors who are as stupid as they are avaricious. However, the avocets still have to be guarded carefully; a continuous staff of watchers will be kept on Havergate Island all through the nesting season for some years to come. Besides looking after the avocets, these watchers act as guides to birdwatching visitors who want to see these beautiful birds. The Royal Society for the Protection of Birds has no objection to anybody going to Havergate Island who really likes birds and wants to help. It has not gone to all this trouble just to keep the avocets to themselves. It wants everybody to enjoy them. I do not think it will be many years before there are avocet colonies in other places in east England; certainly in Norfolk, as well as Suffolk; perhaps also in Essex.

The Hermit Thrush

By RUBY ZAGOREN

I heard him weave his melody
On winds that run and turn
Into the brake where lovely hide
The moss and maiden fern.

Where waters whispered willow words,
Where deer and shy ones roam,
There deep within the wood's green heart
I found the thrush bird's home.



Although a live adult sea mink has never been examined by a zoologist, it is believed that it may have been almost twice the size of the common northeastern mink of the New England States. The illustration shows the sea mink, believed to have been extirpated, in the background, and the present day species in the foreground.

The Mystery Mink

By ROMEO MANSUETI

Illustration by the Author

THERE is a small, scattered band of naturalists in New England who would like to look hopefully at every mink trapped or sighted near salt water. They are seeking a creature that, so far as is known, has become extinct.

The sea mink, *Mustela macrodon*, was a gigantic, reddish-coated species that was prized by fur-buyers of Maine a century ago. Perhaps, due to its somewhat limited geographic range, this animal was not discovered by early American mammalogists when still extant. It is believed to have ranged along the sea coast from New England north to New Brunswick.

In 1903, Daniel W. Prentiss discovered some very large mink jawbones in Indian shell-heaps in Brooklyn, Hancock County, Maine. He described it as *Lutreola macrodon*, the specific name referring to the large teeth. In 1911, from shell-heaps on Flagg Island, Casco Bay, Maine, F. B. Loomis described the same species as *Lutreola vison antiquus*, placing it as a subspecies of the mink existing today. Both of these writers considered the animal an extinct species, and apparently did not

know about the legendary large mink, or existing skins or mounted specimens. Its introduction to science was based entirely on skeletal remains. Thus, it is understandable why the creature became known as the "shell-heap mink."

From various sources, a visual reconstruction of this gigantic mink is possible. George G. Goodwin uses, in his *Mammals of Connecticut*, a photograph of a mounted sea mink captured at Campobello Island, New Brunswick, in the latter part of the 19th century. It was an animal similar in general structure to the common northeastern mink, *Mustela vison mink*, but relatively larger than the largest of the existing species. The large, mounted mink is a faded, light reddish-tan color, much more reddish than the northeastern mink. The fur is coarser, almost wiry. Between the forelegs it has a large white patch about half an inch wide and two inches long.

Manly Hardy, in 1903, published a note recalling that his father, himself, and other fur-buyers had in former years recognized as a distinct form a very large

mink, skins of which were received from islands and the coast of Maine until about 1860. These commanded a higher price than did the skins of other minks. As one of the chief fur-traders in Maine, more than 50,000 mink skins had passed through his hands. Fur-bearers gave this large animal the name "sea mink." According to Mr. Hardy, the animal was large, fat, and had an odor entirely different from that of the common northeastern mink, and its fur was coarser and more reddish. Richard H. Manville has recorded in the *Journal of Mammalogy* that this large mink was most highly developed on Swan's and Marshall's Islands. Mrs. Fannie H. Eckstrom, a daughter of Hardy, wrote, in 1935, that the "shore" or "seashore" minks were "... much larger, very brown, poorer quality of fur and with a pelt noticeably redder, and possessing a peculiar smell." She recalls seeing it in the 1870's and believes it persisted somewhat longer to the eastward of Mount Desert Island.

Large skins of this animal measured as much as 33 inches in total length, and Seton gave its probable total length as 36 inches. The common northeastern mink seldom measures more than 23 inches.

Nothing concrete is known about the life history of this species. Evidently, it was indigenous to brackish estuaries and salt water areas, being found in marshes and around and on islands. Lawrie Holmes, well-known conservationist from Northeast Harbor, Maine, stated that the rough-coated salt water minks seemed, paradoxically enough, to "... stick to the fresh water spring brooks." Its feeding habits may have been conditioned by its marine environment, feeding, no doubt, on fish, muskrats, and perhaps shellfish. One writer has found that the sea mink was associated with the snail, *Helix hortensis*. Dr. Arthur H. Norton, Maine mammalogist, remarked that, owing to its limited range, it was a sedentary species of specialized habits. Two sizes of mink, perhaps representing males and females, respectively, or age differences, have been determined from a study of the jaw bones recovered from the Indian kitchen middens. There is no reason to believe that the natural history of this species differed drastically in habits from those of the common northeastern mink.

Of special interest is the occurrence of the remains of the sea mink in Indian kitchen middens. How Indians captured these animals is not definitely known. Glover M. Allen, in his monumental *Extinct and Vanishing Mammals of the Western Hemisphere*, published in 1942, thought that no other type of mink was found in these shell-heaps. He stated that "... since there is an absence of European artifacts it is believed that these shell-heaps date from previous to, or perhaps up to, the

time of European occupation. Remains are at present known from such sites as far as Casco Bay in the south, and northeastward to Mount Desert and Frenchmans Bay, and Roques Island, Washington County, Maine. ... There seems no reason to doubt that the sea mink is the one that inhabited the Maine coasts in Indian days and persisted up to the latter part of the last century. With a limited range and on account of eager pursuit by the trappers, it probably became extinct about the sixties or seventies." Mr. Lawrie Holmes

recalled seeing mink traps of laths and of the dead-fall variety during the late 1890's around the shore of the outer island near Northeast Harbor.

Dr. Allen has alluded to the dominance of the northeastern mink over the sea mink as the numbers of the latter declined. He stated that the sea mink was the only form of mink to be found in the eastern part of the Gulf of Maine in earlier times. It also was believed to range to Nova Scotia. At present the mink occurring along the Maine coast is the northeastern mink. Dr. Allen adds: "Evidently, this latter race, which has somewhat of a liking for sea-coasts, has taken the place formerly held by the now extinct sea mink. Possibly, too, circumstances favorable to this eastward spread within the last century contributed to the driving out of the larger animal."

Ernest Thompson Seton, in 1921, became quite interested in obtaining information on this species, and he made a

curious appeal to amateur naturalists and travelers, declaring: "There are traditions along the coasts of Maine, New Brunswick, etc., of a gigantic mink known as the sea-mink. ... It was the custom in the small hotels of the above region to have mounted any local animal of unusual interest in point of size, etc. These rarities were kept in glass cases as parlor ornaments or as barroom accessories. If some of our travellers this summer would keep a lookout for monstrous mink in glass cases, also inquire among the old timers for information about the sea-mink, we might get interesting details or even specimens." As a result of his plea, the mounted specimen in the possession of Clarence Clark at Lubec, Maine, was brought to light.

As with every species that has been exterminated in recent times, there is always some hope that the extirpated species will turn up or be rediscovered. A note of optimism was expressed by Mr. Lawrie Holmes when he wrote recently: "It would seem that the southern limit of the range had been receding eastward so that search for survivors would have a better chance of success in the maritime provinces."

The thin thread upon which various naturalists hang their hopes is exemplified by the report of George Goodwin in his account of (Continued on page 218)

Belief

By ELIZABETH
PHILLIPS JONES

Out there
Buds are swelling
Into the dawn-pink sky.

And neath
Old leaves
Wee things whisper,
"Spring is nigh."

The close-shut petals
Folded sheath on sheath
Stayed by earth's firm hand.

Timed to April rain
And then along the hills
The breath of violets
And daffodils again.

Honduras Plans National Parks

By LOUIS O. WILLIAMS

Photographs by the Author

The cloud forest overlooks the San Juancito mining camp, and the still lower village of San Juan. In the distance, 6000 feet lower down, is the Choluteca River and the hot, semi-arid Choluteca River valley. In the far distance is Chile Mountain, also topped with cloud forest.



UNDER the Ministry of Agriculture of Honduras, the Forest Service has jurisdiction over national parks. Today there are two small parks, one in the capital city of Tegucigalpa, and the other a mile or so away. Although called national parks, in reality they perform the functions of city parks. However, the Forest Service, with technical aid received from Point Four and from the United Nations, is drawing up plans for several park areas. These will be similar in outstanding significance to the national parks in the United States.

Two of the areas under consideration, I know personally. One is in the region around Lake Yojoa, biologically and, perhaps, scenically, the outstanding lake area in Central America. The other is the cloud forest area of the San Juancito Mountains in south-central Honduras, not far from Tegucigalpa. From the standpoint of their outstanding scenic character and scientific worth there is no question but both areas should be saved while it is still possible to preserve them.

The urgent need for a national law placing both lake region and cloud forest in special status, setting them aside and protecting the areas, cannot be denied. Both could, and well may, soon lose their value as a result of exploitation, unless steps are taken to preserve them.

Let us consider in some detail the case for the preservation of the San Juancito forest, from conservation, recreation and scientific points of view. This does not mean that it is more important than other areas, or that it deserves more attention, but it emphasizes the assets that Honduras has in outstanding examples of wilderness country that could quickly be lost to posterity by human exploitation.

The San Juancito Mountains are a small, isolated mountain system. They rise well above the general level of the highland peneplain. The elevation of the highest peak is about 7500 feet, but the mountains are high enough to interrupt the free flow of the winds crossing from the Caribbean toward the Pacific. During the rainy season, which is approximately the months from May to November, abundant rains fall in the mountains. The dry season, December through April, is tempered by condensation from the trade winds, and fog is common in the mountains at night during most of the dry season.

The moisture makes possible the luxuriant forest, which now covers the tops of these mountains and once extended much lower than it does today. I prefer to call the forest a "cloud forest" because of the cloud, or fog, formation that occurs there during the critical



This fine cloud forest, only a short distance from the city of Tegucigalpa, may soon get national park status. Clouds and mist make these forests possible. Many kinds of plants not found elsewhere grow in this forest.

cession will be vacated and that past control and protection of the forest land will cease. It is possible, even probable, that undesirable and wasteful subsistence farmers will then begin to make inroads into the forest.

The San Juancito forest is the only reasonably large, protected watershed that can supply water to the growing city of Tegucigalpa. The water supply available is barely sufficient for present needs and undoubtedly insufficient for those that will develop during

season for moisture. Ecologists have more complicated, perhaps more exact, descriptive names for such forest formations.

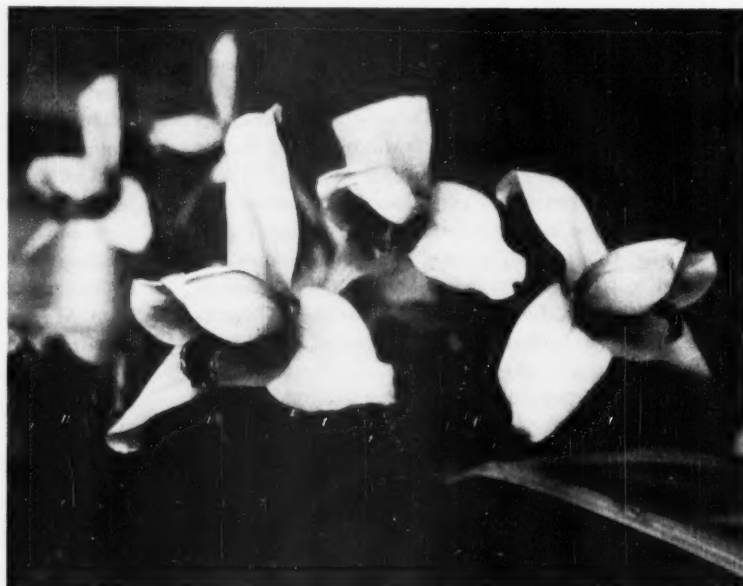
A part of the San Juancito forest is controlled by the national government because it supplied the municipal water for the city of Tegucigalpa. A much larger area of the forest belongs to the New York and Rosario Mining Company, or is controlled by the company under a mining concession from the government of Honduras. A small portion of the forested area is privately owned, and some is municipal land.

The mining company has protected its own concession forest lands for almost a century, to maintain its supply of forest products, mine props and lumber, and to guard its water supply and hydroelectric potential. Fortunately, under this policy, the destructive, shifting agriculture, common in the region, has been kept out of most of the area.

The ore body that the mine has been exploiting is nearly exhausted, and the company has publicly announced that it will discontinue operations early in 1954. So it is assumed that the con-

the latter half of the century. For this reason alone an intelligent, forward-looking conservation and protection program should be undertaken immediately. National park status under the new Forest Service would seem to be the wisest disposition of the matter that can be suggested at this time. If congress writes a disinterested and far-seeing national park code it will benefit the country for years to come.

The San Juancito forest is only some twenty miles from Tegucigalpa; an hour over the present narrow, winding and steep road. There are many places within the forest that could be developed as recreational areas



The white nun orchid, *Lycaste virginialis*, is one of the beautiful and rare plants that grows in Honduras' cloud forests. It has only recently been discovered in these forests.

under proper restrictions consistent with park preservation. The proximity of the principal center of urban population in the Honduran highlands indicates that a recreational area should have a reasonable amount of use.

Scientifically the preservation of the San Juancito cloud forest is important. Many people, including most residents of Central America, are under the illusion that the natural resources of the region are inexhaustible. This is obviously not so, and one has only to look at other mountains that surround Tegucigalpa to see and understand the destructive results of short-sighted and unplanned utilization.

The San Juancito Mountains, and a few smaller mountain areas in the highlands, have a flora that cannot be duplicated anywhere else on the continent. The number of endemic species of trees, shrubs and herbs found in the forest is astounding. There are giant trees in these mountain forests that we have found nowhere else during eight years of botanical exploration in Central America. These are trees that seem to be peculiar to a Honduran mountain top, or to a cloud forest. There are not only one or two species of this sort in the San Juancito forest, but scores of them. Certainly there are more to be discovered.

The fauna of the San Juancitos is not so rich as is the flora, but it is interesting. The cloud forest is the home of many birds, mammals and reptiles. If the habitat

is destroyed then that fauna will disappear. Most Central Americans are proud of that true wildling, the quetzal, even though perhaps not one person in a hundred has seen it. Quetzals are found in the San Juancito forest in some numbers. Their habitat should by no means be permitted to disappear.

Honduras has, perhaps, more cloud forest left than any other of the Central American republics. Guatemala has a little, but this is slowly and surely being cut over for timber, or the forest is being felled to make way for shifting agriculture. El Salvador has a small area of cloud forest along its frontier with Honduras. This certainly will be gone after another five years. When it is gone the last of the virgin forests of that small, overpopulated nation will have become history. Nicaragua perhaps has no mountain high enough to have true cloud forest although it is possible that there is a little along the Honduran frontier. Costa Rica has a fine cloud forest over much of the Cordillera de Talamanca. However, a competent forester, resident of that country, told me some years ago that it was his guess that the Talamanca would be denuded in twenty-five years, victim to the charcoal burners and the farmers' desire for highland pastures for dairy herds.

Honduras has the opportunity to be the nation to point the way to highland forest conservation in Central America. The first parks of *national park* caliber will probably be established by this sound little republic.

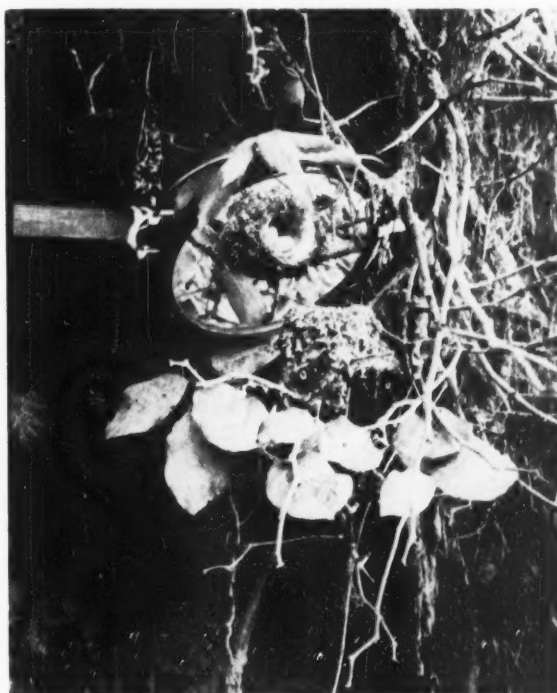
Cliff-Dwelling Hummer

By NORMAN EDSON

WHEN it comes to building nests, hummingbirds are individualists. Each pair has its own ideas as to location. Some build in tall fir trees, twenty or more feet from the ground. Others are content with a two-foot shrub. Between these two extremes you will find hummer homes tucked away in the most unlikely places.

While hunting bird nests with my camera, I found that one pair of rufous hummingbirds appeared to have acquired ideas from the cliff dwellers in Arizona while flying north. A narrow lane had been cut through a fern-covered hill, leaving a steep bank of dirt on one side. The fern roots, exposed by the winter rains, hung like a fringe of yellow strings along the top. Well hidden among these, this eccentric pair had built their nest. Besides being original, the birds had gone "arty," and had added a trim of bright green moss, and bits of dried madrona leaves around the edge. Inside lay two pearly white eggs about the size of beans.

A picture of a nest like that was worth having. But no matter at what angle I set my camera on its tripod, I failed to get a good view of the nest's interior. However, for problems like that I always carry a small, round mirror, about the size of a saucer, and held by a



swivel arrangement on the end of a stick. It is then just a case of tipping the mirror to the right angle behind any bird's nest to get the shot shown above.



Our Difficult Choice

By ALEXANDER F. SKUTCH

Illustrated by Fred Collins

THE attractions that draw us to the living world of animals and plants are subtle and difficult to analyze. If we have the good fortune to come, in early childhood, into close contact with living things of varied kinds, we are often bound to them by a sort of instinctive sympathy that joins life to life. We are already strongly attached to the natural world before we are prepared to ask ourselves just what are the ties that bind us to it. Then we may discover that we are attracted to living things by their beauty, by the fascination of learning their ways, by the tranquility we often find in close association with them. Beyond all this there is that pervasive sympathy that unites us with them simply because we share that mysterious thing called life. Many of us come to love the living world with a deep, intense, unselfish love.

That which we love we seek to join to ourselves by manifold ties. The more numerous and the more massive these bonds, the more we feel that the loved object is truly ours. The chief of these ties are sympathy, harmonious association, and knowledge. Sympathy, which is spontaneous and instinctive, is, of these three, the most difficult to cultivate by purposeful endeavor. Like inspiration, it may come to us unsought, or we may vainly strive to kindle it. Harmonious association and knowledge are, on the contrary, capable of deliberate cultivation. The former is what we mean by goodness; for we commonly call "good" the person or thing that enters into harmonious relations with

In this article Dr. Skutch, noted naturalist, presents an outstandingly thought-provoking discussion of a basic question of moral values. We would be much interested in reader comment on the points that he makes in this article.

ourselves, satisfying some vital need or helping us to attain some cherished goal. "Bad" we apply to that which injures, thwarts, or conflicts with ourselves. The whole purpose of ethics is to make our striving for goodness of this sort steady, rational, and impersonal, rather than capricious and self-

centered. Insofar as we love the living world we endeavor to enter into harmonious association with it, to lead our lives and fulfill our aspirations with the least possible interference with other living things—in short, to cultivate an ethical relationship with Nature. The more we succeed in doing this, the more we feel at one with it.

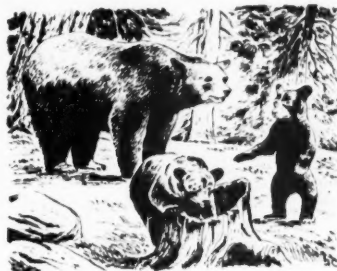
Knowledge also binds us to its object. Much of man's knowledge of Nature has been acquired for purely utilitarian ends, for the purpose of satisfying our basic needs more adequately and easily, and even of multiplying needless luxuries. But over and above this economic motive for learning about Nature, there is a more spiritual motive, which doubtless always existed and grows stronger every year. It is not only, as Aristotle said, that men love knowledge for its own sake. We also love knowledge for the feeling of intimacy with the thing about which we know, for the bond it creates between this object and ourselves. We may, for example, be attracted to a bird by its beauty, or its blithesome song. But it flashes across our delighted vision, its mellow notes die away, and we have lost all immediate contact with it. If we discover how it builds its nest, how it rears its young, or where it

passes the cold winter months, we seem to have established other ties with it, to have acquired a firmer grasp on it. Thus love leads to the desire for knowledge, and knowledge binds more firmly the bonds that love would forge.

In these ways love of living things leads us to cultivate two of the most precious and honored of human ideals, moral goodness and knowledge. We wish to live in harmony with them and we wish to know about them, to understand their mode of life. In many other fields, men cultivate simultaneously the ideals of knowledge and goodness without finding any conflict between them; but those of us who aspire to both of these goals with reference to the living world soon come face to face with a baffling dilemma.

The sensitive student of life is involved in a tragic contradiction that rarely troubles those who pursue other branches of knowledge. The astronomer learns about the heavenly bodies without the least interference with them; he could not break them up for analysis if he would. The physicist investigates the behavior of matter in masses or minute particles without feeling that he is destroying that which he is powerless to create. The chemist knows no twinge of conscience as he dissolves salts or minerals to learn their composition. The geologist who tears apart the strata of the earth to uncover the fossils that lurk within destroys unique structures, but at most he barely scratches the earth's broad face. But the biologist who kills living things to discover certain facts about them, who mutilates them or even upsets their normal way of life to learn other facts, sacrifices the ideal of perfect goodness for the sake of knowledge. If he is morally sensitive as well is inquisitive, he can not fail to feel the conflicts involved in his researches.

I wish it were possible to bring every boy and girl who enters a course in zoology or general biology to a full realization of what lies before him. Perhaps his love of animals, or spontaneous sympathy with them, has engendered the wish to know more about them, and he has taken the most obvious mode of satisfying this desire. Doubtless to cut open a living earthworm, even to dissect an anesthetized frog, does not seem a heartless or a wicked thing to do, and does not clash with the affection for dogs or horses, for furry creatures or for birds, which led him into this study. If he goes on to more advanced courses and is set to dissect warm-blooded animals for which he feels greater sympathy, his aversion toward the occupation may become more intense. But by easy steps we are led to perform with hardly a qualm that which we at first never imagined ourselves capable of doing. Almost before he is aware of the changes that have occurred within



him, the lad who delighted in living birds, and staunchly opposed the destruction of their nests, has become a professional ornithologist, taking thousands of feathered lives in the name of science. Or the youth who hesitated to cut into an anesthetized frog is performing on living dogs and monkeys, experiments that make us shudder. And these men to whom the killing and mutilation of living creatures is a daily occupation, are no longer free to consider with calm detachment the full implications of their conduct. Their daily bread, the welfare of wife and children, depend upon the continuance of these activities. Their moral judgment has been so strained by their economic needs that it is no longer of much value.

It is a pity that the great teachers to whom large sections of humanity look for guidance failed to consider this conflict between goodness and knowledge, which indeed had hardly become a problem in their day. It is likewise regrettable that more recent philosophers and moralists, who have written at such great length on a wide range of ethical questions, have not given this matter the attention it demands. But it is not hard to imagine how some of the revered prophets and sages of old would have treated the question. I have little doubt how Mahavira, the lawgiver of the Jains, and Gautama the Buddha would have answered us. When they forbade their followers to take life they were not thinking, as in the Mosaic code, merely of men of one's own nation, but of all animate creatures. It is highly improbable that they would have made exceptions to their rule when it was pointed out to them that it is sometimes necessary to take life in order to learn how animals are constructed and how they function. They would have told us roundly that the first thing it behooves us to know is ourselves, which we begin to do when we free our minds from all blinding passions and gaze steadily upon our origin and our destiny. They might have gone on to point



out that once we understand ourselves we shall also know as much as is necessary about other creatures, for all living beings are fundamentally the same. Laotse, the Taoist sage who said that the best of men is like water, that benefits all things and does not strive with them, would, I fancy, have returned

much the same answer.

I find it more difficult to imagine how Jesus would have treated the problem. Apparently He believed that the world order, as known to us, was fast approaching its end; and it would have been consistent with this view to hold that knowledge of natural processes is no more necessary for gaining the kingdom of heaven than the possession of worldly goods. Unfortunately, the whole subsequent attitude of the

Western world to this matter was determined not so much by Jesus as by St. Paul, a man as able as his sympathies were narrow. Since he questioned whether God could care about an ox (I Corinth. 9:9-10), he undoubtedly would have maintained that men need have no compunction in gathering whatever knowledge they find useful or agreeable, without pausing to consider how their researches might hurt non-human creatures. For the whole "brute" creation of the Western world, the Pauline view has had tragic consequences.

Since we search in vain through the pronouncements of mankind's most respected teachers for an adequate consideration of the conflict between the ideals of goodness and knowledge that confronts those of us who associate most intimately with the living world, I suppose that each of us must ponder the problem for himself and take his own stand. After years of questioning, I have taken mine. But my purpose at the present time is not to offer an answer to the dilemma, to propound or defend any special view. To do so in a somewhat convincing fashion would entail a discussion of ultimate questions for which space is lacking here. I wish merely to set you to thinking clearly and bravely about this matter, and getting your children to think about it as early as they can. Too long have those of us who call ourselves friends of Nature refused to look squarely at the implications of our position; too long have we slurred over the contradictions involved in it, or hastily accepted conventional compromises, which, when examined, are found to rest upon the flimsiest of foundations.

I should be sorry to create the impression that I see an irreconcilable opposition between the goal of perfect goodness and that of complete knowledge—between the ideals of religion and of science when carried to their ultimate logical conclusions. To find these highest and noblest of human aspirations radically incompatible might cause us to lose faith in the unity and soundness of our nature. On the contrary, I hold that the more adequate our knowledge, the more completely we can realize our ideal of goodness, and the greater our goodness the more perfect our understanding becomes. It is not knowledge itself, but the means that beings with our peculiar limitations in sensory and mental equipment are often driven to employ in the pursuit of knowledge, that so often causes us to violate our ideal of goodness as applied to the living world. It is quite conceivable that beings with more penetrating minds and an ampler endowment of senses than ours should learn all that we aspire to know without harming any living thing.

Too often we take the shortest and easiest way when a more painstaking method would yield not only the information that we desire but bring us fuller understanding in the end, all without injuring the creatures

we investigate. In studying the nesting habits of certain species of birds in which the sexes can not be distinguished by appearance or voice, I have sometimes wished to learn which member of a pair was the male and which the female. Two ways were open to me—to shoot one of the birds and perform an autopsy, or to see which of the two laid an egg. The first method would have given me the desired information in a few minutes; the second required many hours of careful watching, but by it I discovered things that I could not have learned from a lifeless corpse. In investigating the resistance of animals to climatic extremes,

we can, if we have the necessary expensive equipment, confine them in freezing chambers or heated compartments until they die, or we can observe how different climates and extremes of weather affect them in their free state. The first method is quicker and easier, but the second may yield the fuller knowledge. We can base our anatomy, and the classification

that rests upon it, on the study of animals deliberately killed for this purpose, or limit our researches to those which die by means beyond our control, as the human anatomist must. Again the first is far quicker, but the second more satisfying to the spirit, and perhaps there is no great urgency in this matter. Facts of anatomy and physiology, which today it seems impossible for us to discover without killing or maiming animate creatures, tomorrow, with improved apparatus and methods, will be learned from living animals without causing them any harm. Many researches for which biologists are willing to torture or to sacrifice great numbers of animals are directed to questions of doubtful importance.

Since, once we pass beyond the narrow sphere of human society, our conventional religions and philosophies fail to provide guidance, each of us must decide for himself whether goodness or knowledge is to be given precedence, whether it is more important to cultivate harmonious relations with living things, or merely to know about them. In reaching a decision on this pressing problem we shall be influenced by considerations of the most diverse kinds, but two seem to merit particular attention. The first is that of completeness, of the possibility of reaching the goal we set for ourselves. We must admit at the outset that neither perfect goodness nor complete knowledge is, for beings such as we, an attainable ideal, but at best a limit toward which we can advance by an endless progression. Since we can not eat without destroying some living thing, can hardly take a step in the open fields without crushing some minute creature, it is obvious that so long as we live and move we can not attain that ideal of goodness which consists in cultivating harmony with all things. Although in past ages the savant could make all recorded knowledge his province, in modern times the growth of the (Continued on page 215)



Flowers Tell the Easter Story

By M. H. BERRY

Photographs by the Author

"BEHOLD, He has risen," the angel said. "His countenance was like lightning, and his raiment white as snow, and for fear of him the keepers did shake."

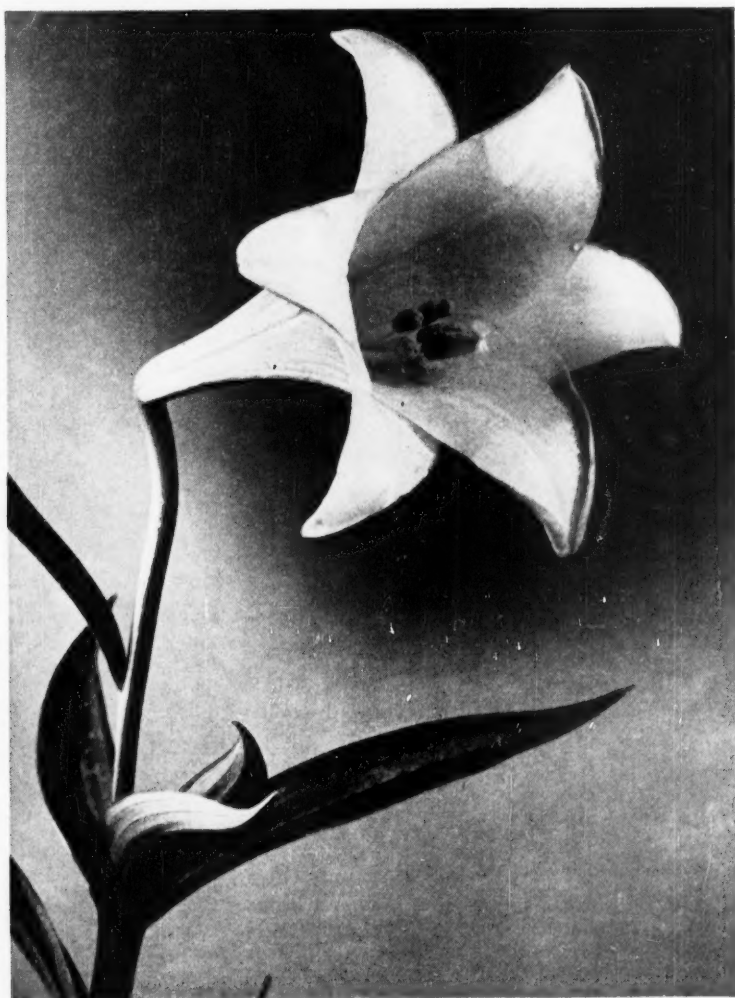
Through the centuries fact and legend have become intermingled with the story of The Crucifixion. Animals, flowers, and even the elements have become woven into its story. But in the spring, at Easter, it is especially fitting that flowers



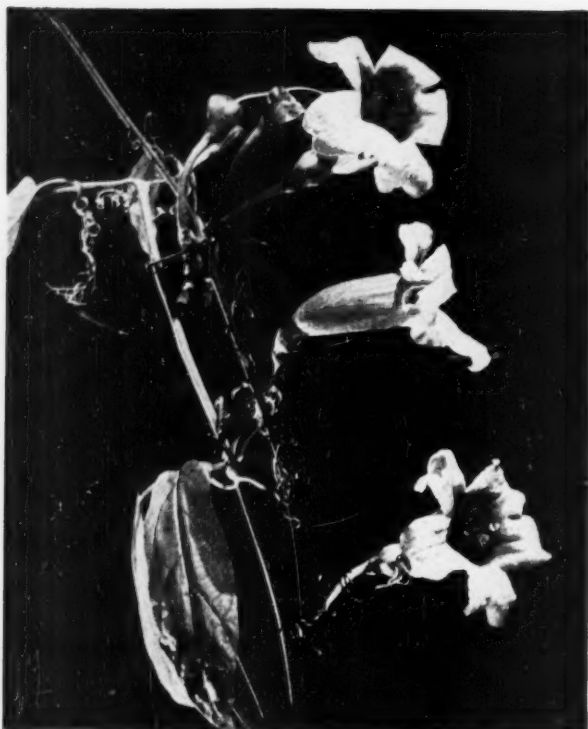
Legend has it that the dogwood was once a large, majestic tree, towering high above the other trees of the forest, but when they crucified Christ upon a cross fashioned from its wood, the dogwood was doomed to become a small, tortured tree that would forever bear the mark of the Cross in its bloom. The flower's four white bracts represent the Cross, the notches in the bracts the imprints of the nails that were driven into His hands and feet, and the stain about the notches, His blood.

should help tell of it, for they too, in a different way, are resurrected.

Man, through the ages, has marveled at this wonderful awakening of the wild things, and has naturally associated the advent of spring with the resurrection of our Lord. Thus, in fact and legend, the flowers tell the Easter story.



The legend of the Easter lily belongs to Mary, the mother of Jesus. It was St. Thomas, according to a Roman legend, who refused to believe in the resurrection of the Virgin Mary, and had her tomb opened. When this was done he found it full of white lilies. Then he looked up and saw the Virgin ascending into heaven. To reassure him she dropped a snow-white lily at his feet—an Easter lily—symbolic of the purity of the Virgin Mary and the flawless life led by Jesus.



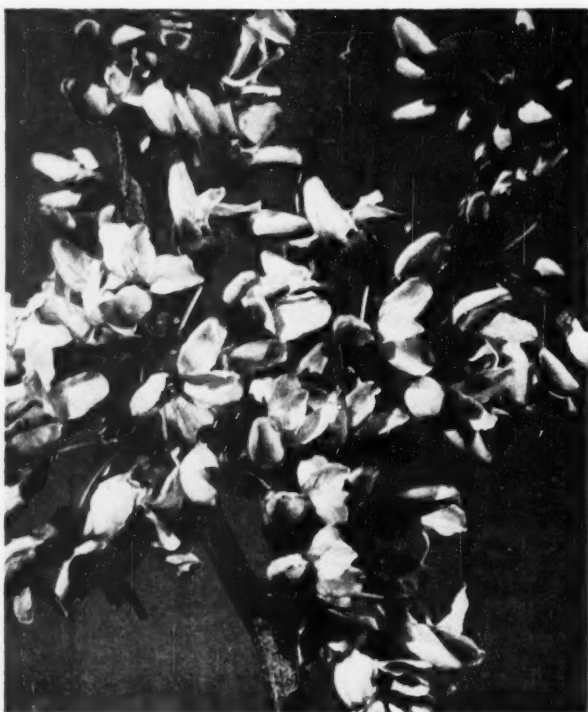
As the Savior was carrying The Cross on the way to Calvary, most of the plants along the way laid their bodies prostrate upon the ground so that His feet might be spared the rocks in the path. The proud trumpet flower was an exception. As the Lord passed he was cruelly tripped upon its branches. From that day on the trumpet flower became a dependent vine with the blush of shame upon its petals and the mark of the Cross in its pith, and it is appropriately called the "Cross-Vine."

On Palm Sunday we are reminded of our Lord's triumphal entry into Jerusalem. In accordance with an ancient tradition, "A great multitude spread their garments in the way; others cut down branches from trees, and strewed them in the way." Thus the palm plays its part at Eastertime.

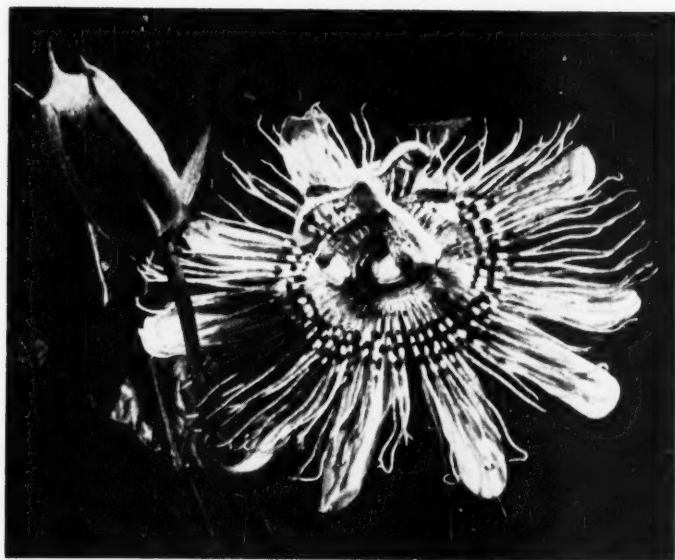
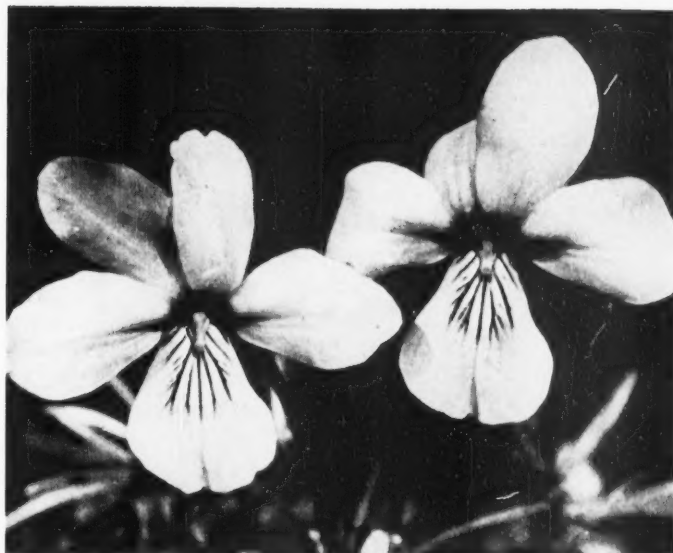


The night before The Crucifixion, when Christ walked in the Garden of Gethsemane, all of the flowers along the path bowed their heads in deep humility, but not so the lily. Vainly conscious of its own beauty, the lily stood erect to comfort Him by its loveliness. When Christ saw the flower, He paused a moment in the silent moonlight, and as he did so the lily saw His deep humility. The arrogant plant was overcome with shame and the red blush that spread over the petals lingers still.

According to legend, the flowers of the redbud tree were white, but upon the night that Judas betrayed Christ, the flowers changed to crimson, and when the body of Judas hung from its boughs the branches drooped and, from the flowers, drops of blood stained the ground.

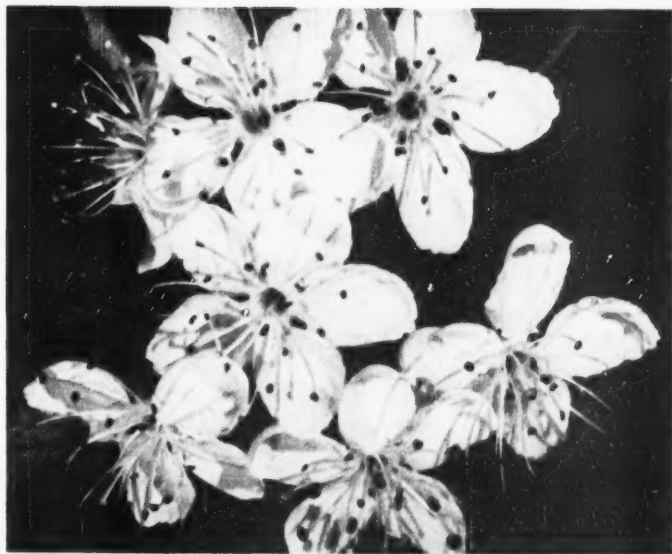


When Jesus said, "Father into thy hands I commend my spirit," he bowed his head and gave up the ghost. The darkness that had prevailed over the land gave way to sunshine. The shadow of The Cross fell upon a violet, which drooped its head in deep sorrow and a purple color spread over its petals as it mourned.



In this single flower is found the entire story of the Passion. The fringed border is the crown of thorns. The column in the middle spreads into a cross. Above the cross are the nails that pierced His hands and feet. The lance-shaped leaves represent the lance that pierced His side, and beneath them are brown spots symbolic of the thirty pieces of silver. Along the stem are tendrils, representing the cords that bound Him. So this is called the passion flower.

As far back as the fourteenth century, a writer who called himself Jehan de Mandeville said, "Then was our Lord yled into a gardyn, and there the Jewes scourged hym, and maden hym a crowne of the branches of the White Thorne, whiche grew in the same gardyn, and setten yt vppon hys hed."





The large flowered, great, or white wakerobin, *Trillium grandiflorum*, also called white-lily and bathflower, is a favorite over a wide range extending south to North Carolina, west to Arkansas, and north to Ontario and Minnesota. Blooming in May and June, it may stand 18 inches high, with flowers four inches across. The petals usually open white, turning pink only with age. The berry is red and fully one inch in length. Sports occur with more than the usual flower parts, and other organs are then multiplied in proportion. Wherry lists this trillium as the most satisfactory for cultivation, "thriving even in ordinary garden loam." The flowers are highly sensitive to light and follow the sun's course from east to west. The 1500 American naturalists who responded to Moldenke's questionnaire, in connection with his *American Wild Flowers*, ranked white trillium sixth in popularity of the 1080 plants nominated.



Perhaps the most beautiful of all the trilliums is the dainty painted wakerobin, *Trillium undulatum*, also popularly called paintedlady, wild pepper, Sarah, and Benjamin. The white petals are narrow, distinctly veined and notched, and "painted" with crimson Vs near the bases. The short-stalked leaves are broadly ovate, tapering to a sharp point. The fruit, ripe in September, is a bright red, polished, erect berry. Ranging from Nova Scotia and New England, south along the Appalachians to Georgia, and west to Missouri and Wisconsin, it favors damp woodlands where in spring it brightens many a brookside, swampy wood, or the borders of forest roads. Wherry lists it as "the most difficult trillium to cultivate," requiring permanently acid humus soil," cool in summer, and free of rodents. The plants shown here are doing well in the heavily needled floor of a Connecticut white pine grove.

Trilliums

By JOSEPH R. SWAIN

Photographs by the Author

WHILE the migrant birds are returning to our northern woodlands, and the trees are still in bud, portions of the sunny forest floor may be spangled with the blooms of the wakerobin family. Trilliaceae, as our botanists know the family, is a small tribe—only four genera and thirty-five species around the world—but one of the loveliest. The common family name, wakerobin, indicates that several of the northeastern species are in flower as the robins return to New England.

Generally speaking the plants are erect, single-stemmed, six to eighteen inches tall, smooth, and spring unbranched from short, scarred, tuberous rootstocks. The leaves and flower parts are arranged in threes or multiples thereof, from which the best known genus, *Trillium*, takes its name. Although a monocotyledon, the broad, usually ovate

leaves, arranged in whorls at the end of the stem, are not parallel-veined, but netted, veins and veinlets interlacing. The single flower, white or colored, with or without a stalk, appears in the center of the whorl of three leaves. Its three green sepals alternate with the similarly radial petals, in the center of which are located the six stamens, the three-branched stigma, and the three-celled ovary, which develops into a more or less angular, greenish, orange, or red berry. The three-part arrangement of the plant has also suggested such popular names as herbtrinity and trinitylily.

The family, although small, is so widely distributed that almost every section of the United States has some representatives. Our illustrations, however, include only the best known species of the genus *Trillium* of our Northeast.



Most widely ranging and variable of all the trilliums is the red, or purple, *Trillium erectum*, whose blooms brighten rich woodlands from Nova Scotia to Alberta, south to Georgia and Alabama, during April, May and June. The flowers vary from dark purple to maroon, and may be even pink, yellowish-green, or white blotched with purple, as shown above. However, identification is easy because the centers remain the same whatever the color of the petals. The odor is unpleasant like carrion. Its berry is dark red and round-ovate. Popular names for the plant are many, such as "raw meat" and "wet dog" trillium, nose-bleed, stinking benjamin, birthroot or bethroot. It may be cultivated with some success in gardens where the soil remains cool throughout the summer.



Another group in the genus comprises the stemless trilliums of which we illustrate the sessile wakerobin, *Trillium sessile*, known also as toadshade or toad trillium. The leaves, also stemless, are blotched with various shades of green, brown or maroon; and the petals, maroon, dull magenta, or greenish-yellow, stand erect, shading the other flower parts, so that the pollinating insects must push their way in to the blossom. Extends south to Florida, and is frequent in New England and Minnesota. It may be cultivated in light soil, partially shaded, if the tubers can be protected from rodents. The bloom has a fragrance that has been compared to the strawberry shrub. The two plants shown above had yellowish blossoms and were photographed in Shinn's Grove, Woodbury, Connecticut.

Of the two species with pendant or drooping flowers, we illustrate the nodding wakerobin, *Trillium cernuum*, locally known also as groundlily, coughroot, white benjamin, Jews-harp-plant, and snakebite. The blossoms, bent on short, recurved stems hide shyly beneath the leaves; the petals long, white or pink, with wavy margins, and curled back almost in a semicircle, giving great prominence to the pistil and stamens with their load of yellow pollen. The photographer must lie on the ground to take the portrait of this fair member of the genus, which ranges over an area similar to that of the painted trillium. Cultivation in the moist areas of woodland gardens is often successful.





Titans of Tioga. Defiant of storm and the ages, these stocky giants of the Pass battle the high-altitude gales to wrest another hundred years of life from hostile elements. Few tree-warriors of the heights withstand such merciless exposure; yet commonly they grow unbent, even on the Sierra's wind-blasted summits.



Tioga Pass. From the tree-titan's lofty ledge one looks eastward through this forest-floored groove in the High Sierra. Note the granitic domes smoothed by Pleistocene ice caps, the glacier-carved pass, and erratic boulders and rock debris scattered on broad glacial pavements far below.

Titans of Tioga

By JOHN L. BLACKFORD

Photographs by the Author

UP FROM the mighty conifers of California's montane timberlands, beyond dark, lichen-laden firs of the subalpine forest, past gaunt lodgepole pines pioneering across boulder-strewn glacial pavements, farther still than Tuolumne's alpine meadows and you come to a vast granitic groove in the High Sierra called Tioga. Here, at ten thousand feet, you wind between solid, ice-smoothed, gray-granite walls to surmount the backbone of the Sierra Nevada. Then, leaving Yosemite Park, you roll precipitously down one of the great mountain escarpments of the world to find yourself, a little dazed by the experience, at the edge of the desert. Yet it is above all these, higher than the glacier-gouged floor of the Pass, far above ice-blue waters of Tenaya Lake mirroring its deep granite trough, that you find the Sierra junipers—the Titans of Tioga.

Probably the most magnificent of all timberline trees,

this massive mountain juniper displays here, on the rock walls of Tioga, a number of its most notable specimens.

It was during one of those rare alpine days, in June, 1940, that I first found them. Intense blue skies and a smiling sun briefly warmed the barren granite. Lazily drifting summer clouds picture-patterned the gray, forbidding summits. It was on a narrow, sloping shelf, a thousand feet above Tenaya, just where cliffs rose sheer above them, that the giants were waiting. And I had only a pocket camera!

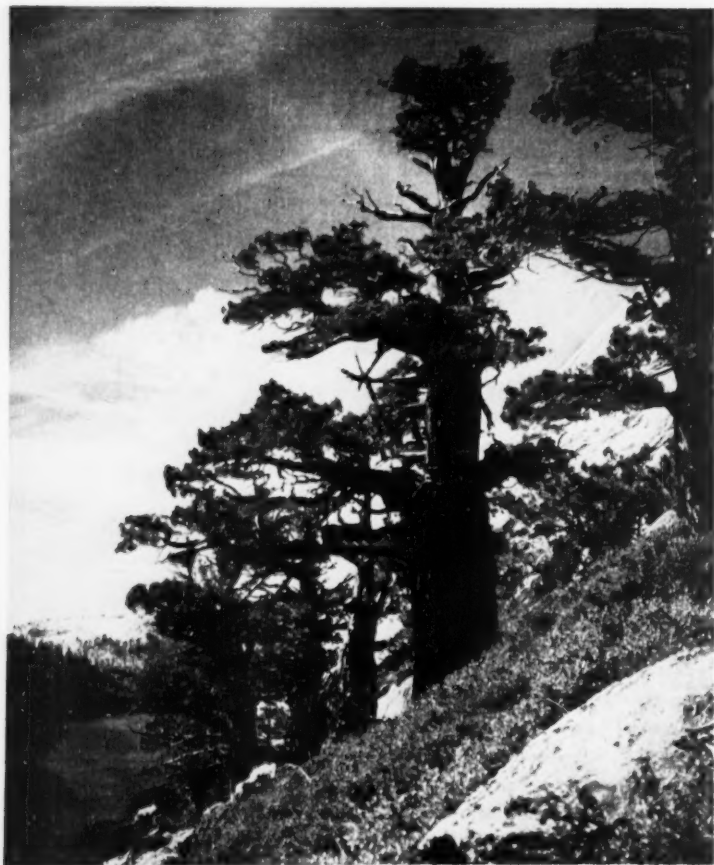
Six years had gone before I drove again over Tioga Pass, climbing the vast scarp up from Mono Craters. Above now was the steel blue of a chill September sky. Wisps of cirrus were drawn in taut strands across it. White-caps on Tenaya, the bite of wintry wind, and cold moistness of alpine air told that the fleeting mountain summer had long since departed. By the time I had packed, breathless,

half-way up Tioga's north wall, menacing mist-clouds were resolving from the glacier blue of the Sierran sky. And before the last of eight "pics" were taken, their frosty, crystal whiteness swiftly smothered the sun. Then high-altitude winds raced with them to spread a formless sheet far eastward. A storm began to lash the ledge—but I had the pictures. The Pass itself lay under long lenticular clouds; the Titans of Tioga wrapped in sunshinel

Where do these giants of the wind-timber make their stand?

From lower northwest elevations and the Cascades, Sierra or western uniper, *Juniperus occidentalis*, advances southward, past Mt. Shasta and over the Warner Plateau, to follow mainly the east slopes and crest of the Sierra Nevada into the San Bernardinos of southern California. On exposed high mountain slopes and canyon sides, braving barren bed rock and skeletal soils of the stony heights, it finds its most-loved home. Uncommonly attaining thirty feet in height, and rarely sixty in protected situations, it may yet attain three to five feet in trunk diameter. A heavily buttressed, fast-tapering trunk is characteristic, for thus it

Silhouetted against the fast-revolving mist-cloud of a bleak September sky, this mighty Sierra juniper strikingly portrays the sturdy qualities that this species achieves against alpine odds. Note how it dwarfs the immature pine at the left.



grows to defy upright the sharpest gales. On the high, outcropping, gray-granite core of the Sierra, where fierce winds torture, and the long cold suppresses life, its great girth may represent eight centuries of embattled growth.

Sometimes on these exposed domes and glacier-cut peaks, bare and gnarled, ghost-like skeletons testify to the inequality of the struggle. But more often, shielded by their thick, cinnamon-brown, fibrous bark, these giants show the phenomenal proportions and densely-grained wood of great age. And regularly they continue to bear the blue-black berry-cones that continue their kind.

For the great altitude and unmitigated exposure-conditions of the wind-lashed ledge on which they grow, the Titans of Tioga have achieved mammoth size. High on a lofty cliff-shelf, they do not reveal this from below. More intriguing is the spectacular growth-forms found in their thin but formidable ranks. Wild and sinewy upflung arms and mighty boles strikingly portray nearly a thousand year's herculean conflict.

The massive, conical trunk, the giant, wide-flung arms, and the deep-grooved bark that armors these titans of the Pass above Tenaya Lake, and make Sierra juniper a notable mountaineer wherever found, are all portrayed by these lusty tree-warriors of the California summits.

In Whom Shall We Put Our Trust?

REGARDLESS of any legal interpretation it may find to justify its action in opening to shooting hitherto legally inviolate wildlife refuges, the United States Fish and Wildlife Service in so doing is morally guilty of fraud, deception and repudiation of its publicly given word.

Here is the record.

When the law was enacted establishing the Federal Migratory Waterfowl Hunting Stamp, popularly known as the "Duck Stamp," it provided that ninety percent of the revenue from the sale of this stamp should be used for the purchase of *inviolable* waterfowl refuges. Many refuges, so acquired, were added to the National Wildlife Refuge system.

In 1948, faced with the need of more funds for law enforcement and for refuge acquisition, the Fish and Wildlife Service, with the support of such sportsmen's groups as the National Wildlife Federation, the Wildlife Management Institute and the Izaak Walton League, asked that the price of the duck stamp be increased from one to two dollars. Appended to this proposal was a provision that the Director of the Service might open to public shooting not to exceed twenty-five percent of the area of any refuge, if and when the waterfowl population justified such opening.

To this last provision the American Nature Association, the National Audubon Society and others objected. The bill failed of enactment, but appeared again in 1949 with, as we said editorially in June, 1949, "the sanctuary matter covered with some semantic legerdemain." We asserted that "The proposal to break down the sanctuary status is vicious, and the more devious it is the more vicious."

As a result of strong opposition there was inserted in the bill the provision that refuges acquired with duck stamp money prior to July 1, 1949, would remain inviolate. At the hearings, which we attended and at which we testified, Milton C. James, then Acting Director of the Fish and Wildlife Service, emphasized that "it cannot properly be said that the amendments will authorize the opening to hunting of any of our existing inviolate sanctuaries." Oscar L. Chapman, Secretary of the Interior, and Albert M. Day, Director of the Service, went on record to the effect that the proposal applied only to "future acquisitions." The House Committee itself stated: "There is nothing in this bill that will authorize the opening of areas heretofore acquired as inviolate sanctuaries, and *it is not the intent of your committee that the presently existing inviolate bird sanctuaries be opened to hunting.*" The Senate Committee spread this identical sentence upon the record in its report, but we have supplied the italics.

Somewhere along the way the words "after July 1, 1949," were deleted by the House Committee, very quietly and *before* the committee's assurance, quoted

above, appeared. The Senate bill went to the Senate *with* the date still in it, and was so passed, as was the House bill *without* the date. In conference the House version was accepted and the measure enacted into law and signed by the President.

It was assumed that the Fish and Wildlife Service was administered by men of integrity, that the word of the Service was to be relied upon, and that the plain intent of the committee of Congress would be binding. In *Nature Magazine* for October, 1949, we commented on the enactment of the law, still questioning its propriety but conceding: "While we still think that the law belies the original intent of the act, *with existing sanctuaries safeguarded* it may be that the need for additional funds, and the progress that has been made in wildlife management, justify the legislation." The italics indicate that we thought the Fish and Wildlife Service as good as its word.

However, last year, the Director of the Service quietly—almost surreptitiously—opened five inviolate refuges—St. Marks, Willapa, Lower Souris, Tamarac and Horicon—to public shooting. Indeed, he authorized opening *all* of Horicon in Wisconsin, despite the limiting provisions of the law. And Wisconsin authorities went along, without regard to the provision of State statutes that says: "No person shall at any time or in any manner hunt or trap within the boundaries of any wild life refuge."

The Fish and Wildlife Service bases its action on the provisions of the law as passed without the limiting date of July 1, 1949. As the law reads the Service says that it can legally justify its policy. But, to do so, the law must be interpreted retroactively, and that point is certainly in dispute. But there is such a thing as a moral obligation to the Congress of the United States and the people of the United States. Both were victimized by this action. Of course this policy pleases some duck hunters, who are thus given special privileges. Also, it may be good politics, and moral considerations are usually minor to political considerations. But this policy is still downright dishonest, and the law should be amended by restoring the July 1, 1949, date.

We are happy to learn that Wisconsin conservationists do not intend to take this action sitting down. The Citizens Natural Resources Association of Wisconsin, Inc., is taking steps to fight in the State courts the opening of Horicon Refuge. The treasurer of this Association is Harold D. Roberts, 610 Harrison Street, Black River Falls, Wisconsin, and funds are needed to fight this betrayal of trust and this repudiation of what were assumed to be words of honor.

We hear a great deal nowadays about juvenile delinquency, and the fraying of the moral fiber of our people. If we cannot rely upon the integrity of individuals in public office, who should certainly provide leadership and example, in whom *shall* we put our trust?

No Slave to Her Garden

By ROSALIE EDGE

THE longing for a garden is deep-rooted in the hearts of more people than, perhaps, we guess. How pathetic are the cans and broken jugs on city fire-escapes, where bright-blooming plants flower with little to encourage them other than love. How often people, both men and women, say to me: "If I might only have a garden where I go for my holiday!" But the holiday is short, and the belief is strong that gardening must begin in the early spring, and be continued until each plant is tucked away safe against winter cold.

"It's not necessarily so," however. The gayest garden I know, radiant with varied bloom throughout the summer, begins for its owner not earlier than the middle of June, and is abandoned to its own devices early in September. This has gone on for many years, the garden always growing more beautiful.

The simple fact is that there is no central heating in the house, which is a mere adjunct to the garden, and even the open fire in the living-room is inclined to sulk in smoke. The garden's gentle warden cannot live there except in warm weather, and the circumstances of her life prevent her visiting it at any other time. Nevertheless, for about two months each year her garden is the envy of professional gardeners and garden club-members whose well-tended places surround this little "space of flowers" hidden beside a busy road in New Jersey.

She arrives the middle of June when, so she tells me, the place, about three acres of garden space, is seemingly a hopeless wilderness. David, a true gardener, although still a schoolboy, is then ready to help her, but for only two days a week. He attacks the lawn and the grass paths; and she, whom we know in winter always so daintily dressed, now in bluejeans and boy's shoes, with her hair in two braids, pulls at the weeds. She pulls at them all day for some two weeks—exhausting and unremitting labor. The last barrow-load of weeds having gone to the compost pile, she rests; then gardens more leisurely all summer.

On her arrival, there was no sign of any garden flower, but soon the roses are released and spaded; the hollyhocks, strong with the exercise of reaching for the light, appear already budded; the yuccas breathe in the sunlight; the lilies spring joyously upward. Many other flowers come to view, old friends, but on reappearance a glad surprise. (No, not delphinium. That haughty plant belongs to court circles, and this is a garden of the heart.) The early spring shrubs and flowers show by seed pods that they had a successful season. The little apples and pears and peaches are set.



PHOTOGRAPH BY WILLIAM GRIDLEY

The gentle warden of the garden, Mrs. Evans, among the plants and flowers that she finds to be no burden.

The peonies are a hedge of foliage. She hopes that all the spring bloom was enjoyed by others. But first attention is given to the garden's summer glory, the phlox.

The phlox is everywhere. It overflows into every bed; it has made new beds of its own; it has seeded down in brilliant borders around the vegetable garden; it stands in bright array in front of the grape arbor. Many of these sites were self-chosen, for not one new plant has been brought in, not in years. How the garden originated is a matter of conjecture. It was formerly owned by an elderly couple, and must have been planned and planted not less than fifty years ago. The quaint, misshapen box testifies to the garden's age. Killed back in many a cold winter, it always renews itself in soft round cushions of bright new growth. No one can be found to name the variety of the climbing rose that obliterates the little arbor. The only renewal of the phlox is of its own seeding. It grows tall, sometimes to six feet. Its stalk is (Continued on page 220)

A Walking Mountain

By J. SINGLETON SWITZER

AT SEVEN o'clock the night of December 28, 1943, a series of quakes, accompanied by underground rumblings, shook the little village of Sobetsu on the island of Hokkaido, Japan. By midnight 49 shocks had occurred, and within the following 24 hours 115 were recorded. None of these shakes was violent, although the frequency was unusual.

In a land born of earthquake, a moderate tremor receives but moderate attention, and in Hokkaido there are some fifteen active volcanoes, one of which, Mt. Usu, is only a few miles from Sobetsu, a farming settlement of some 6000 in Iburi sub-prefecture. The people grow beans, wheat, rice, and flax. They enjoy the loveliness of one of the most beautiful National Parks. Their little town rests on the north shore of delightful Lake Toya (sometimes written Doya.) There are surrounding mountains with restful valleys. In summer the country is enchanting; in winter it is majestic.

By January, 1944, this peaceful scene was disrupted. These contented people were frightened. Farmers said their fields were rising into the air! Yet, with the tenacity of all good farmers, they refused to abandon their homes and farms. Isolated rural communities such as Sobetsu seldom have any scientifically minded citizen. But Sobetsu had Postmaster Masao Mimatsu. He was looked to for advice upon all manner of things as are many postmasters in small towns. Since weather is all important to farmers, Mimatsu had made a special study of weather. He took time and pains to record the rainfall, the snowfall, the temperature. He even attempted, with fair success, to forecast the weather. He assisted the farmers in surveying their lands.

So, when these earthquakes began, Mimatsu faithfully noted them. He visited the fields and verified the farmer's reports that the earth was rising. He found one area of farm land that was, indeed, pushing upward at a rate of approximately eight inches a day, forming a sort of inverted saucer.

After three months, the postmaster's records revealed, a part of the former farming lands had become a hill 75 feet high. By June, 1944, Nature had manufactured a dome-shaped young mountain 160 feet high.

Shortly thereafter this mountain staged its first real eruption, sending smoke and ashes thousands of feet into the heavens. Craters appeared on the mountain.



"Showa Shinzan," the mountain that grew from the farmland and "walked."

These began to move slowly southward as they formed, while the highest elevation of the mountain marched northward!

This strange behavior attracted widespread attention. And, despite their apprehension, the Sobetsuans took pride in "their" mountain. They referred to it as "the walking mountain," but gave it the formal name of "Showa Shin Zan." The word "showa" means "peace and enlightenment" and is significant to the reign of Emperor Hirohito. "Shin" and "Zan" translate into English as "New mountain." Sometimes the name is spelled "Showashinzan," or "Showa Shinzan."

Then pride in their mountain turned to fear. Toward the end of November there came a night when great chunks of rock and earth hurtled from the erupting craters. Hundreds fled for safety. Only the valient and stubborn stood their ground. The mountain grew to 430 feet and kept moving laterally, about five feet a day!

Two months later, on February 11, 1945, the first molten lava and fire burst from the new volcano. Smoke and steam poured from the existing seven craters. Few dared to remain in the area, but Postmaster Mimatsu stuck to his recordings. The convulsions lasted until September 9, 1945, when the mountain attained its greatest altitude, 1610 feet. Gradually the violent activities subsided and the farmers warily began to return to what was left them by "their" mountain.

From December, 1943, until September, 1945, the brick-red "Showa Shinzan" had roared around like a shackled bull-elephant. It permanently desolated 750 acres of fertile crop land, usurped 25,000 additional acres, rendered more than 150 families utterly homeless, and temporarily impoverished hundreds. Today, the mountain remains (Continued on page 220)

The Bug-Hunters

By LUKE NEELY

IN THE cemetery that lay just beyond the fence that enclosed my house in Kamakura, Japan, the old gravestones crowded together under a few low trees. During most of the year it was a quiet place, from which there occasionally floated the fragrance of incense burned by someone who had come with flowers or a cup of fresh *sake* to put before a family stone. After the rains had lifted in June, cicadas settled there to make their soporific music, and then, with the closing of the schools, came the hunters.

The first one arrived alone. One day I looked out and saw a red net floating at the end of a long bamboo pole, which seemed to be rooted behind one of the biggest stones. After a while the lower end of the pole came into sight, and with it a boy wearing short pants and an air of determination. He carried a small bamboo cage slung over his back on a string.

The insect noises coming from the trees of the cemetery showed there was something there to be caught, but it took a good deal of peering to pinpoint it. Standing on the moss-covered stone of the Yasuda family, the boy finally got his cicada with a swift jab of the net into a tree. After the captive had been safely caged, he examined it with satisfaction, said a few words to it, and then was off again in pursuit.

The hunters came every day after that, usually in pairs, with the younger carrying the cage. We became accustomed to the sudden happy cries of the successful and the exclamations of indignation from those who were too slow or too clumsy with the net.

One of the best beaches in Japan lay a short distance from the cemetery, and I used to wonder how

these young men could prefer stalking insects in a graveyard to playing in the surf and operating the rubber-band-powered submarines that were so popular with the primary-school set. One day I got the answer from a lad named Tatsuo, who had just netted a fine big dragonfly and was in a mood to grant a few words to a layman.

What kind of insects was he after?

"Big ones."

How many had he caught?

"So far, seven kinds. I need three more."

Why three more?

"Because we're supposed to get ten different kinds."

What for?

"School. It's homework for the summer."

Did the girls have to catch them too?

"They're supposed to." A patronizing smile.

He was called away by his cage-bearer, who had a beetle under observation, and when I left the two of them were closing in on No. 8.

That smile of his was not hard to interpret. Girls came to the cemetery too, usually in large packs. They brought nets but never seemed to catch much. One posse of young ladies abandoned the hunt and spent an irreverent hour at hide-and-seek among the stones. Another made a catch that did not count—a crab. They thought he was wonderful and took him away to show off, leaving the insects undisturbed. The long, silent approach to the bug was not for these frivolous creatures, and I suspect that a good many of them were able to turn in a full bag when school reopened only because a brother had helped with their homework.

April Song

By ULRICH TROUBETZKOY

Now like the hull of maple buds
the heart may shed its carapace,
its winter shell as April floods
with its green blood cell-filtered space,
to surge through trunk and branch and stem,
light synthesis of chlorophyll.
Feed on the tide of sun like them,
like hyacinth and daffodil,
be nourished on this radiance.
Where soil was stirred with share and sheth,
the seeds leap toward deliverance,
earth's metaphor denying death.
Be glad, like warblers who have come
along the flyways of our spring,
like tanagers who travel from
the forests of Peru to sing.

Battling the Bark Beetle

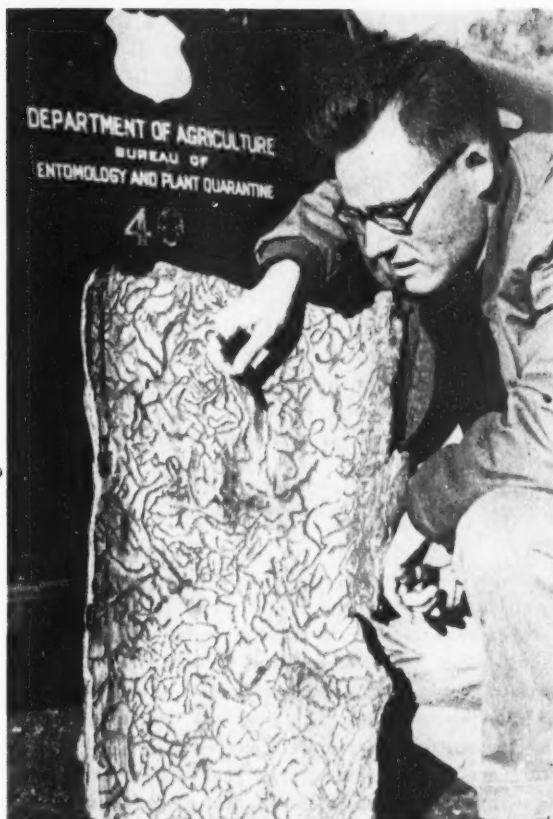
By ETTA GOULD LIVELY

U.S. Forest Service Photographs

WHEN the storms of late autumn still the threat of fire in the forests of the Southwest, National Forest personnel chart plans for winter war on another arch enemy, the western pine bark beetle.

Firefighters, who hacked brush on firelines to halt the onslaught of furious flame in summer, again work in mountain forests, felling great evergreen monarchs, victims of this beetle, *Dendroctonus brevicornis*.

Of the many species of bark beetles in American forests, this type is by far the most destructive. It attacks ponderosa and Coulter pines in our Pacific States, from British Columbia to southern California. The dark, hard-shelled insects, about the size of a grain of rice, bore into the bark of pine trees. They dig egg tunnels, moving into the inner bark to cut the cambium layer, the tree's vital tissue. Eggs laid along the sides of these tunnels hatch into white, legless grubs. When the larvae complete feeding on the inner bark, they change into the pupa, or resting stage, then to new



Tunnels in the bark show what pine bark beetles can do to a tree. When they have done their work the forester must cut out the doomed trees. The infested tree at the left is being topped.

adults, later emerging from the bark to fly off and attack other trees.

The pests leave behind them a trail of doom-introducing fungi, blue stain, and yeasts, which penetrate the sapwood. These plug the sapstream from roots to foliage. Although these beetles may be encouraged by mismanagement, they do not threaten perpetuation of our forests. However, they do take a heavy toll of needed wood.

Pine bark beetles, in the primitive forest, acted as Nature's forest managers and loggers. Young, crowded stands were thinned by the engraver beetle. Growing trees, escaping the havoc of fire and storm, reached maturity, to be harvested by the bark beetle.

Also, they played their role in forest succession. In the Cascade Mountain Range long ago, fire wiped out a stand of fir and hemlock. White pine, and lodgepole, with enduring, fire-resistant cones, came to reestablish the forest cover. When these were one hundred years old, fir and hemlock again began to grow, the pine beetle, making its debut once more as Nature's forester, eliminating 95 percent of the pine overstory.

However, we cannot now permit the wastefulness of the beetles. Crude foresters, they waste with reckless abandon. The first report in the United States, made

in 1877 by Franklin B. Hough, showed the damage done by South Carolina bark beetles in 1802.

The U. S. Geological Survey report of 1898 made by H. B. Ayres gave the damage to a white pine stand in Montana. In 1902, Gifford Pinchot organized the first field group of foresters. They gazed out over the ghostly white spectres of thousands of trees in the Black Hills.

As with fire, the western pine bark beetle presents a challenge to entomologist and forester alike. Complete surveys have not yet been made due to lack of funds. Then, too, causes are still not fully understood.

When factors are right, beetles increase their population with lightning speed. Natural factors, however, reduce this potential destruction, thanks to predators, parasites, and unfavorable weather. A stand of timber in itself is not enough to produce an epidemic. The trees must be susceptible, through poor growth, injury, or wind weakening. Weakened trees offer little resistance by pitch flow. From these weakened trees, the hordes move on to healthy stands, overcoming them by sheer force of numbers.

A stand of timber on the San Bernardino National Forest near Lake Arrowhead threatens a beautiful recreation area. Fire several years ago wiped out an area north of the lake. Beetles, flying during summer, moved into mature stands of living timber. Infestation was unusually severe in the Little Bear Creek burn. "During 1951-52, the insect job was underfinanced," said District Ranger George Lang of Arrowhead Ranger Station. "But, through the cooperation of Federal, State, and private agencies, progress is being made to cut and treat the diseased trees. The Bureau of Entomology made an independent study by flying the area and plotting infested trees."

"The U. S. Forest Service made a similar ground study," he continued. "They estimated that 2000 trees needed to be treated. The approximate cost per tree was \$18.94, with average diameter of trees treated, 17 to 22 inches."

Often forestry crews work when snow covers the ground, and most woods creatures have either left for warmer climes or curled up to hibernate in some snug hideout until spring. But the demure mountain chickadee, hooded and caped for the worst of winter weather, becomes their staunch assistant. This diminutive worker moves along with the "bug" crew, hopping about filling his stomach with hapless grubs.

The bark beetle can stand heat to 120°, but it cannot endure sub-zero temperature, dying at 5°. For this reason, it is a much greater threat to our southern forests than to colder northern woods.

Spotting crews move through the forests and mark infested trees. A fading of the green of the crown tells the story of hordes of torpid grubs, tunneled beneath the rose-brown bark. Excessive pitch flow gives the story poignant reality.

Crews, working with chain saws, fell the massive trees. Cutting them into saw-lumber lengths, the logs



Pumps that pumped water in the summer to fight forest fires now pump an insecticide to destroy beetles or grubs in infected bark.

are then sprayed with another ally in the endless fight to save the forest—an insecticide, toxic, oil spray called orthodichlorobenzene. Fire trucks that pumped water in summer on flaming woodlands now pump oily death on pine beetles. The saturated bark is then stripped and burned, along with the slash pile of limbs. Finally, loggers haul the denuded logs to the sawmills.

There is hope for the future in better forest management, sanitation in logging enterprises, cooperation between National, State and private timber owners, sound silvicultural methods, and increased understanding and imitation of Nature's methods. Forest fire prevention, too, looms large in importance. Beating the beetle to harvesting mature trees is also high on the list, providing usable timber and helping young trees.

Nor should we discount that busy forest creature, the woodpecker, who alone is a prodigious worker and never faint-hearted. While fire-in-the-forest, along with battling-the-beetle, present unending challenge to the forester, the businesslike rhythm of the busy woodpecker's 'rat-a-tat-tat' resounds through the tall timber. Spiraling trees from base to tip, he tattoos his way along, gobbling beetles.

As one forester remarked, "If we'd concentrate on raising a whopping supply of woodpeckers, we might lick this problem with their help."

The Parula Goes West

By KEN LEGG

"THE finding of a Parula warbler's nest should be marked on the calendar as a red-letter day," Frank M. Chapman once said. One may wonder what kind of a day he would have called it had he found a Parula's nest in California, three thousand miles from the bird's usual breeding range.

To Francis Williamson must go the distinction of being the first person to hear the buzzy trill of this warbler in California, for on May 18, 1952, he came to my house in no mild state of excitement, wishing to share his discovery. I was away that Sunday morning on a bird walk, but three days later, and for two months thereafter, I followed the male Parula and two females through the woods whenever free daytime permitted.

Point Lobos Reserve, located about in the middle of California, supports several good-sized areas of Monterey pine. This reserve, and the private property across the highway, practically unvisited and undisturbed by man, offer a forest canopy under which has grown up a tangle of poison oak, blackberry vines, and other low plants. Being close to the ocean and subject to abundant moist summer fogs, the pines are heavily draped with the western lace lichen. This plant somewhat resembles the eastern lichen, *Usnea*, so extensively used by the Parula warbler for nesting.

Ornithologists visiting Point Lobos often thought of Parula warblers when they saw the abundance of this lichen. They were not surprised to learn that, when three Parulas did come to California, the birds chose this habitat, which so nearly matched their summer homes in the East. However, it was surprising to find that this species, not heretofore recorded west of Nebraska, had reached California. Yet Dr. Joseph Grinnell once said that, if we waited long enough, every bird in North America would be recorded in California. But two nests, and, possibly, two breeding pairs, seemed unbelievable.



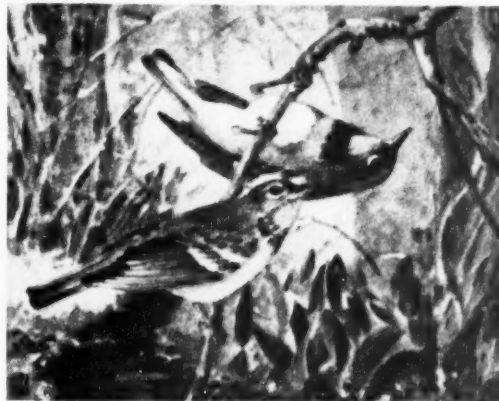
Monterey pine festooned with western tree lichen. This habitat proved acceptable to the Parula warbler, perhaps because of the similarity to its eastern nesting place.

On the morning of May 21 I was trailing two ornithologists. Although we did not know it at the time, one male Parula was pursuing one prospective mate through the tree tops, stopping at intervals to sing, and to confuse and excite the three of us who were watching.

The male was active about one side of a sun-bathed eastern slope, always on the move. The two experts and I had dashed to the scene on hearing the songs, and one of the men had neglected to bring his binoculars. Between trying to get into position, attempting to share one pair of glasses each time the bird was sighted, and discussing what this strange visitor might be, we three doubtless would have attracted more attention by our antics than a flock of dodoes.

Both the experts knew the Parula from previous encounters, and no doubt each knew in his own mind that "this was it." Both probably wanted to be the first to say so, but each was hesitant to commit himself. Neither saw a pair that morning, but I excitedly tried to point out a second "blue" warbler with a yellow throat and no breast bars while the other bird was in sight in another tree. Neither of my companions saw this, and even when the male flashed down a lichen-hung aisle it was suggested that he was probably pursuing a pygmy nuthatch.

This ended the Parula story for the two ornithologists until the following month, both being reticent, and desiring time to refer to the literature and check the status of this wanderer.



The Parula warbler, *Parula americana*, is our only bluish warbler with yellow throat and breast.

So convinced was I that there was at least one pair that I began spending practically every morning and evening in the woods. Early in the morning of May 26, I had a glimpse of a male pursuing what I took to be a female. They were foraging in the tree tops and I could not be sure that I had seen a pair.

Succeeding daily observations brought the male to light many times, but the female was not seen again until the morning of June 8. Then I had the opportunity to observe, at good range, a female leisurely feeding in a wild lilac bush. This removed all doubt that at least one pair was present.

My enthusiasm inspired a friend to accompany me to the woods at six the following morning. We found the male singing and flying about the pines on the other side of the highway, where we soon saw a pair of the warblers. My companion phoned a third interested friend, and, on the morning of June 10, we three saw a female entering a hanging strand of lichen.

Every morning from June 10 until July 1 there were observations of this nest, which was to be called the number one nest. Then, on July 1, in an attempt to follow the male, I chanced upon another female chipping excitedly from a small pine. Presently the tail of the male was seen protruding from a thick strand of lichen twenty feet above the ground. I realized I had found a second nest in which there were young birds that were being fed.

The summer of 1952 was unusual in that several eastern species turned up in California. An oven bird was heard "calling for his teacher" near Carmel, and several redstarts were reported, and also a hooded warbler. Incidentally, the season followed one of the wettest winters in many years, and there was a decided increase in numbers of such regularly breeding species as the pileolated and the lutescent warblers. High fog

draped the Monterey Peninsula, including the area where the two *Parula* nests were located, and this may have created an attractive situation. Daily observations at the number one nest revealed that at least one young was fledged. For several days after leaving the nest this youngster perched in a coffee berry bush, *Rhamnus*, about four feet from the ground. Apparently, however, some predator got this bird, for the adult female was seen bringing food to the shrub although no young warblers were present to receive it.

The second nest produced at least three fledglings. They remained fifteen or twenty feet above the ground and were watched being fed by the male for about a week after leaving the nest, the female having disappeared. It is highly probable that at least some of these were able to participate in the southward migration, which took place about the middle of July.

The Museum of Vertebrate Zoology has created a standard for acceptance of first occurrence in California by requiring that at least one specimen must be taken. Although no less than a dozen competent naturalists observed one or both of the nests, no specimen was taken. Consequently the bird cannot be added to the State list until, and if, one is secured.

Inasmuch as one nest was in a reserve where no collecting has ever been permitted, and it was hoped that this visitation might mean establishment of a breeding population, it was decided not to collect but to wait until 1953 to see if the bird returned.

A thorough search of the area and surrounding country was made last year and no sign of the *Parula* was found. However, 1953 was the driest summer in twenty years, and even most of the pileolated warblers passed the area up for other more moist places. But there is still hope that the *Parula* will again be seen using the hanging clusters of lichen at Point Lobos.

The Tree Frog

By MAUDE WOODS PLESSINGER

When the pussy-willows silver
And the crocus wakes from sleep,
The peeper frog puffs out his throat
And chants, "Knee-deep, Knee-deep."
Then Mister Hyla goes a-wooing,
Singing early, singing late,
Caroling his changeless ditty
Till he finds himself a mate,
"Knee-deep, Knee-deep, Knee-deep."

Though a very tiny creature,
With what volume he can sing!
When he starts the serenading
Of his lady love in spring.
Clear, far-reaching on the night air
In a chorus, loud and long,
Comes the piping of the peepers
Chanting one insistent song —
"Knee-deep, Knee-deep, Knee-deep."

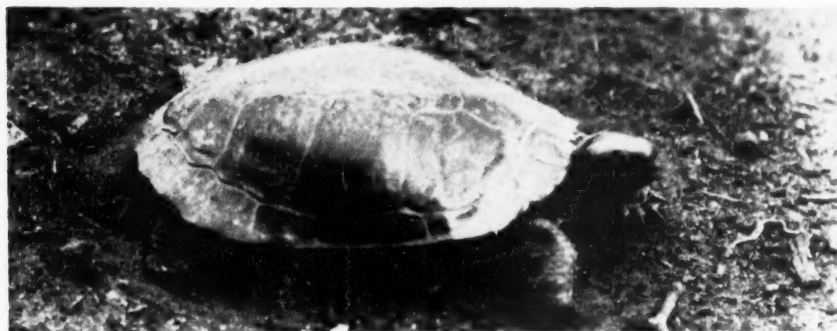
Painted Turtles in Saskatchewan

By H. H. PITTMAN

Photographs by the Author

MOST of us are accustomed to thinking of turtles as creatures of warm areas, delighting in quiet rivers and sleepy backwaters. So it is rather a surprise to find them in parts of western Canada where the ground may freeze to a depth of four or five feet and where the longest frost-free period of the year is usually less than one hundred days. In spite of the severity of the climate of Saskatchewan, which is probably the coldest of the prairie provinces, turtles occur there in some numbers, one species reportedly even

The commonest species around Wauchope, Saskatchewan, is Bell's painted turtle. The western painted occurs also but is much rarer here. However, Professor Rawson of the University of Saskatchewan tells me that painted turtles of one kind or another are fairly widely distributed throughout the southern part of this province. The snapping turtle is also found and has been taken from the Souris River at Oxbow. The eastern form of the painted turtle does not seem to reach Saskatchewan.



Bell's painted turtle is relatively common in the seemingly inhospitable climate of Canada's Saskatchewan Province, where the ground may freeze to a depth of four or five feet. Below, note the underside of this turtle, the symmetrical pattern showing faintly.

ranging as far north as Prince Albert, or roughly about three hundred miles north of the boundary line between Canada and the United States. The slower rivers are probably their highways, and from these they spread out to suitable lakes across the prairie. When such places begin to dry up, or become too alkaline, the reptiles seem to return to the rivers again, completely disappearing from districts they formerly occupied.

The winding Souris River in southeastern Saskatchewan is the home of practically all the turtles I have seen, even of those found twenty or thirty miles away from it. Turtles sometimes travel long distances overland, probably taking advantage of every stream or pond encountered, but generally following an undeviating course to their destination, perhaps a river or lake of the position of which they seem to be aware. I have frequently found them half a mile from water of any kind and occasionally more than thirty miles from places where they could normally be expected to occur. Their sense of direction must be well developed for, when released after being picked up, they always resumed their original course with stolid, steadfast purpose.



Few of the commoner wild creatures of the prairie are more misunderstood than the painted turtles, and it is almost impossible to get reliable information, even from people who have lived among them for years. Fact, fiction and folklore are interwoven to such an extent that inquiry is generally useless. The question of size is a good example of this for, although the largest specimen I could find was only about nine inches from end to end in a straight line, and nine and three-quarter inches over the carapace lengthwise, an elderly lady told me she had seen one that must have measured thirty inches or more, and I have often heard of twenty-inch ones. As many of the statements gathered came from anglers it is possible that some of the tales told of

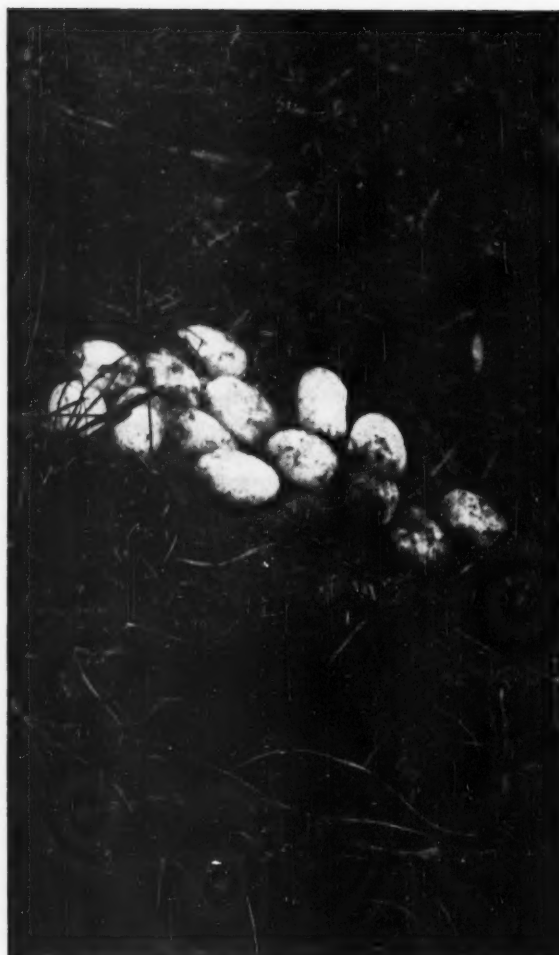
huge turtles on the prairie are exaggerated. [These may refer to snapping turtles. Editor]

The carapaces of the painted turtles are dark olive-green, with the horny plates sometimes outlined with narrow greenish-yellow lines. The decorations to which the common name is due are on the underside of the marginal plates and on the bridges. These are beautifully marked with bright yellow and green and, occasionally, a little dull red. The upper surface of the edges of the lower shell, or plastron, which, by the way, is serrated in front, has a different green and yellow pattern, but this is hard to see in a living specimen. The pale yellow underside of the plastron provides a ready means of identification in the field. Bell's has a deep yellow central spot of varying shape surrounded by a broad blackish and more or less symmetrical band. The western form merely has a dark patch in the middle, while the eastern one is unmarked.

This protective coloration is most effective in the water. On land, western turtles do not seem to rely on coloring to escape observation and are extremely wary. Just what they see, or how far their vision extends, is difficult to say, but they can detect movement at a considerable distance when they are sunning and immediately plunge into the water, stirring up sufficient mud or sand to conceal themselves almost instantly. I once placed a western turtle in the shallow water of a little pond, hoping to watch its actions, but it disappeared at once in a cloud of silt, dead leaves and weeds. Basking turtles may not appear again for an hour, or even more, when disturbed, and on windy days, when the grass and bushes are in constant motion, they are nervous and often rest for long periods with just their snake-like heads above the surface before venturing ashore.

On the prairie adult turtles can have few enemies except, perhaps, man. I have never heard that the plains Indians caught them for food or used their shells, but it seems probable that they did for I know of an old camping site beside the Souris River in Manitoba that was almost carpeted with weathered and burned shell fragments until cultivation of adjoining land loosened the soil and allowed drifting sand practically to obliterate it. Newly hatched turtles, of course, are vulnerable and are preyed upon by birds, beasts and fish to such an extent that probably only a small percentage attain full growth. Sometimes a heavy toll is taken of them as they leave the nesting-holes and, more rarely, when they get temporarily trapped by falling into pot-holes with unscalable sides in their attempt to reach the comparative safety of the rivers. I have rarely found young turtles and never heard of them voluntarily coming to shore, so perhaps they feel that if they are out of sight they are out of mind.

Fortunately for them, they are said to grow fairly quickly during their first two years. After that development slows down and they enter a period in which they have been described as "slow to live and slow to die" and growth seems almost to cease. The



Nest-hole and eggs of Bell's painted turtle. The eggs were covered with a tough, parchment-like membrane and measured 1.25 by .75 inches.

length of time taken to reach maturity may be affected by temperatures and food supply, hastened, possibly, when conditions are favorable and retarded when they are not. The turtles are popularly believed to reach a great age but most of my informants based their opinions upon stories of specimens caught bearing old and usually questionable dates carved on their shells.

Painted turtles come out on dry land to excavate their nests, and these are so well concealed that few are found. Incidentally, this habit gives us a most interesting glimpse of the early history of these creatures, showing that at a remote time, in the period spoken of as the Age of Reptiles, their aquatic ancestors left the water for some reason. Perhaps they were not aggressive enough and the competition was too severe, or possibly a glimmer of ambition stirred them and they felt a desire to adventure in a new realm. We can only guess. All we know is that they stayed long enough to adopt some of the habits of terrestrial creatures, and then returned to the water again! Perhaps the terrifying Age of Reptiles was ending and their huge sanguinary contempo- (Continued on page 218)

A Beaver House

By J. MURRAY HOLLISTER

ALONE male beaver came to Lake Mansfield Vermont, in the spring of 1945 and cut a few small poplar trees on the shore of the lake. His house was built in the fall, and my introduction to his majesty was the following June.

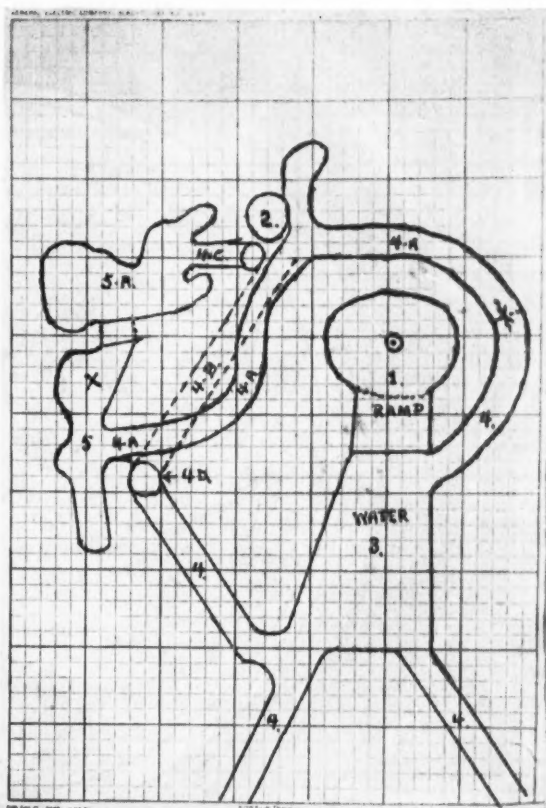
Fishing from a boat near an island close to the shore, I was enjoying the sunshine when startled by a small explosion at my back, a few feet from the boat. Turning, I saw a ripple, then the head of a beaver as he entered a small bay. Investigation disclosed an island house that had been occupied the previous winter.

From then on considerable time was spent watching the habits of this lone beaver. During the first two summers he was playful, and seemed to enjoy hide and seek in the early evening with people in the boats. Then he gave up the sport, and became exclusive.

One observation showed unusual skill. A poplar tree, eleven inches in diameter, grew at the edge of the lake, and, due to high water, the beaver could stand on the land side only. A cutting was started, but stopped, leaving four inches of trunk, and the tree did not fall. I inspected the tree daily for more than a week. Then one morning it was in the lake, with a cutting on the lake side. Inspection showed that a platform had been built in the water. It was made of stones, sticks and mud, and evidently served as a footing on which the beaver stood to finish the job.

The last time I saw my chisel-toothed friend was the latter part of June, 1951. No evidence of cuttings for food around the lake shore, or up to the feeder brooks, could be found. There was no storage of food at the house and it was not occupied that winter. The house was left, and a legal permit was obtained to investigate the beaver's winter home for five years of his life. Many people do not know, and others care less, that in many States it is unlawful to disturb a beaver house, whether occupied or vacated.

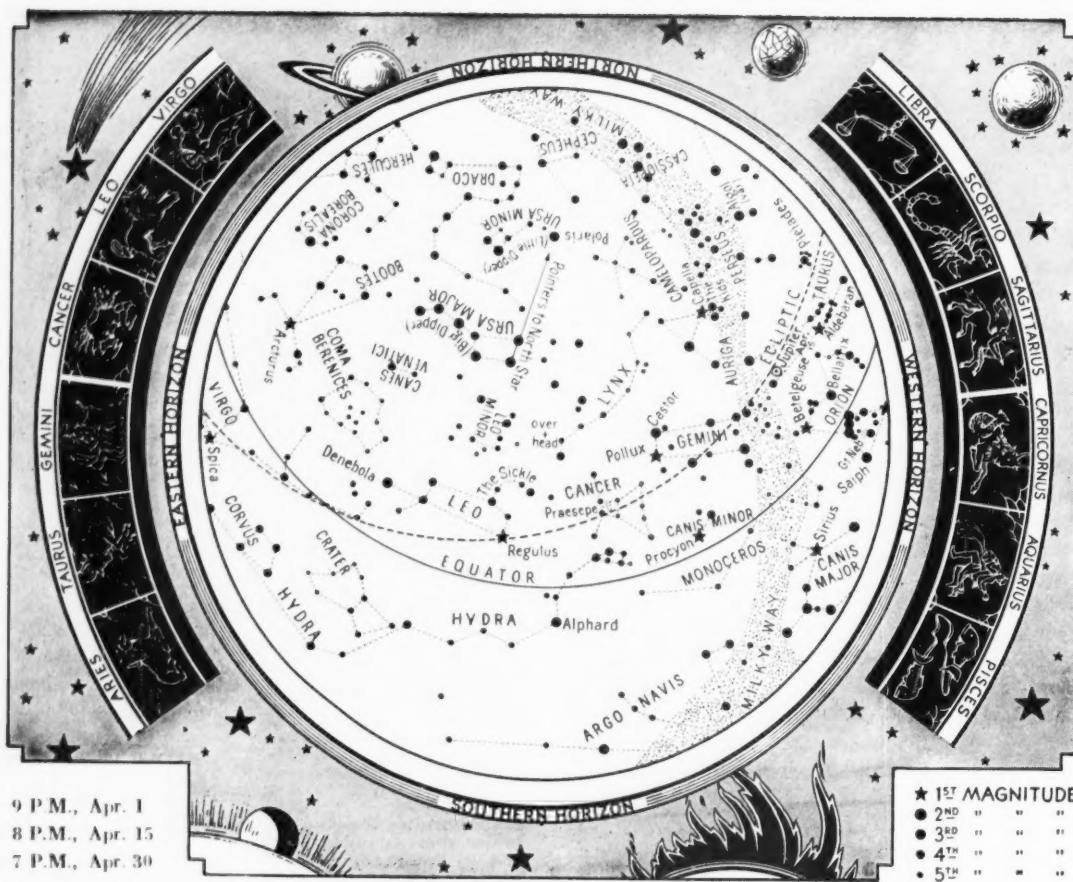
As the house was on an island the approach from the lake is an interesting feature. An apron built of long poles, anchored in the edge of the island and extending into the lake for about ten feet, covered the approaches of the two water burrows to a pool in front of the dining room. The poles were criss-cross, as well as straight, with supporting mud and stone that extended that section of the island, and gave extra support to the apron. The shore of the island, on both sides of the entrance burrows, was rip-rapped with stone and sticks. Even a six-inch tree, about fifteen feet long and with limbs removed, had its top anchored in the apron and the long roots anchored in the island bank. The distance between burrows at the edge of the island was five feet at the water pool; in front



Scale drawing showing a "bird's eye" view of the beaver house, dimensions being taken from a stick in the center of the dining room (1). This room was 18" by 20" and 8" high, with a ramp about 16" above the pool bottom. 2 is a birch tree 8" in diameter, the ventilator following up its side. 3 is the central water pool where the two burrows from the lake met. 4 are water burrows, their horizontal diameters 6 to 7 inches and vertical diameters an inch or two more. 4A are dry burrows and 4B a sub-burrow starting under the roots of the tree from 4A and connecting with burrow 4 near the sleeping room entrance. 4C is a ventilating burrow from the second sleeping room, 5A. While the arrangement of the burrows offered various means of escape, it also suggested a means of one-way traffic, useful with a large family. In addition, the exit at 4D is a vertical drop of several inches to water, but with no ramp. 5 is the first sleeping room with X indicating the bed of dried leaves and grass. The room was 12" above the dining room level. 5A is the second sleeping room with an entrance from the first. This room was about 6" higher than the first, making it 34" above the bottom of the water pool, which is about the normal level of the lake in winter. There was only one outside entrance for the two sleeping rooms, the second showing no evidence of occupation. It was larger and had more roomy recesses, possibly intended for youngsters. The diameter of the house was about thirteen feet. The use of the recess at the right of the tree is unknown. The house, as used during the first winter, was later enlarged, so this recess may have been used as a first sleeping room.

of the dining room sixteen inches. The distance from the center of the dining room to the edge of the island was six and three-fourths feet. The depth of water at the outer edge of the apron was four and one-half feet. The depth of water at the food storage in front of the apron, where food had previously been observed, was five feet.

Never having seen the (Continued on page 220)



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

A Remarkable Lunar Eclipse

By ISABEL M. LEWIS

THE total eclipse of the moon that occurred on January 18, (E.S.T.) of this year, and which was so successfully observed, was noteworthy for several reasons.

The duration of the total phase of this eclipse was exceptionally short, only about thirty minutes. The longest possible duration of the total phase of any eclipse of the moon cannot exceed about one hour and forty-four minutes.

The magnitude of this eclipse, which is a measure of the extent to which the moon is immersed in the earth's shadow at the time of its greatest eclipse, was 1.037 in units of the moon's diameter. As the moon has a diameter of approximately 2160 miles, the distance to which the earth's shadow extended beyond the nearest limb of the moon at the middle of the total phase was only .037 times the moon's diameter, or about 80 miles.

At the time of greatest total eclipse, that is, the moon was practically grazing the edge of the earth's shadow. The intensely brilliant illumination of the circumference of the moon along this region of nearest approach clearly indicated these unusual circumstances, which the calculation of the elements of the eclipse showed existed.

The width of the shadow of the earth at the distance of the moon is on the average about 5700 miles. It may vary as much as 200 miles either way. It is affected by the varying distance of the earth from the sun, and by the varying distance of the moon from the earth. The length of the earth's shadow, which closely approximates a cone in shape, the vertex of which lies directly opposite to the sun, is about 859,000 miles when the earth is at its mean distance from the sun. It is about 14,000 miles less when the earth is nearest the sun, and about 14,000 miles greater when the earth is farthest

from the sun.

The distance of the moon from the earth ranges from about 221,500 miles to about 252,700 miles and is, on the average, about 239,000 miles. The width of the earth's shadow at the distance of the moon from the earth is affected, of course, both by the distance of the earth from the sun and by the distance of the moon from the earth, both of which are variable within definite limits. The average width of the earth's shadow at the distance of the moon—found to be approximately 5700 miles—gives a radius for the shadow of about 2850 miles. As the width of the shadow varies about 200 miles either way, according to the relative distances of the bodies at different eclipses, its radius, or distance from its center to the edge of the shadow, will have a range of 100 miles from the average value of 2850 miles either way. The average width of the earth's shadow is, at the distance of the moon, about two

and two-thirds times the diameter of the moon.

The moon may enter the shadow either centrally, that is so that it has contact with the center of the shadow, in which case it is called a central eclipse, or it may pass entirely to one side or the other of the center of the shadow. In a central eclipse the distance from the edge of the shadow to the nearest limb of the moon may be as great as 1900 miles, approximately, at mid-totality, or as small as 600 miles, depending upon the width of the shadow in that eclipse and upon how far the center of the moon is from the center of the shadow at the time. If the moon passes entirely to one side or the other of the center of the shadow, so that the eclipse is non-central, its greatest distance from the nearest edge of the shadow cannot exceed about 800 miles; and in exceptional eclipses, such as that of January 18, the nearest approach to the edge of the shadow may bring the two nearly in contact during the middle of the eclipse.

The moon rarely, if ever, disappears completely from view, even in those total eclipses in which the center of the moon's disk passes close to the center of the earth's shadow at mid-eclipse, and the duration of the total phase is near the greatest possible value of 1 hour 44 minutes. The night side of the huge earth-globe then turned toward an observer on the moon would be seen to be surrounded by a brilliant ring of light, which is that of sunlight sifting through its atmosphere and which is diffused and refracted into the earth's shadow to illuminate with a weird, coppery light the surface of the eclipsed moon.

Even when, in some eclipses, the moon may be deeply immersed in the shadow a thousand miles or more from its nearest edge, it has been seen faintly illuminated by light bent into the shadow by the atmospheric ring sur-

rounding the night side of the earth in the sunrise or sunset zone. The brightness of the eclipsed moon will depend upon the transparency of the earth's atmosphere in these regions at the time of the eclipse and the distance of the moon from the edge of the shadow. The shadow of the earth, because of the strong infiltration of light into it from the atmospheric ring surrounding the earth, has hazy and indefinite outlines.

In the calculation of the phases and circumstances of eclipses of the moon the width of the earth's shadow at the distance of the moon is increased by one-fiftieth of its value to include the effect of the earth's atmosphere on the shadow. The lack of any sharp outline to the edge of the shadow and the gradual falling off of illumination from the earth's atmosphere makes it difficult to observe or predict, within as much as half a minute, in some instances, the times of beginning or ending of the various phases. The increase in the

radius of the shadow at the distance of the moon amounts to about 58 miles in this border zone, in which there is brilliant illumination originating in the earth's atmosphere. This was the source of the exceptionally bright light diffused and bent into the shadow to the nearby surface of the moon which was found to be only 80 miles inside of the edge of the shadow at mid-totality in the eclipse of January 18 of this year. It was observable at the time of the total phase of this eclipse, also, that the illumination of much of the surface of the moon clearly showed that coppery tinge that is so characteristic of light that has passed for long distances through the denser strata of the earth's atmosphere, and has been bent and diffused through the earth's shadow to the surface of the moon.

The total lunar eclipse of September 25-26, 1953, was one that resembled in some features the eclipse of January 18 of this year. The duration of its total phase also was short, only 46 minutes, and its magnitude was, in units of the moon's diameter, 1.084. It follows that the distance of the nearest point of approach of the moon's limb to the edge of the shadow-cone of the earth at the middle of the total phase of that eclipse was about 181 miles. In that eclipse, also, the brilliancy of the portion of the moon's limb nearest to the edge of the shadow was noticeably greater than the normal coppery illumination that was diffused over the entire lunar disk otherwise. In that eclipse, although to a less degree than in the total eclipse of last January, there was a near approach of the moon to that border region of the shadow-cone where the diffused light from the earth's atmosphere is most intense. In most total eclipses of the moon there is no such near approach, or nearly grazing contact with the border region of the earth's shadow (Continued on page 218)

Novae

By DANIEL SMYTHE

And so fantastically in place,
It punctuates its galaxy
Until one feels in icy space
The roar of its gigantic sea.

And holds a breath for what in night
Has known a stellar hurricane,
So vast no words or thoughts seem right
Beyond our puny wind and rain.

The School Page

By E. LAURENCE PALMER

Professor Emeritus of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

SOME PRACTICAL APRIL FOOLS

THIS morning I spent trimming my grapes, changing Nature and my environment to the end that, next fall, a few square yards of my side yard may yield some pleasure to me and much pleasure to the neighbors' youngsters. As I trimmed the plants I wondered if it was worth while. I knew that along about the time school opens next fall some of my nicest young neighbors will find it most convenient to play in my yard. I am certain that, as the play continues, it will gradually center in my grape arbor, and, eventually, the sounds that I hear of their voices over the rat-tat-tat of this typewriter will cease. Then I know that if I step out quietly I can see the grape vines shake and I can either let out a yell and see the youngsters scatter, or can grin and go back to work, realizing that maybe it was worth while after all that I trimmed those vines on a wintry day.

I understand that one year, when no one was at home, one of the youngsters stood outside the house and yelled a request, asking if it would be all right if he took some grapes. Hearing no reply he told the other youngsters that I had said they could help themselves. I knew that the grapes vanished, but not until one neighbor brought over some grape jelly, in appreciation of the grapes I had given their daughter, did I know the whole story. Well, that is just a part of life. The little diplomat who yelled that request when I was probably miles away may become a leader of men, as he was a leader of boys, and the little girl who brought over the grape jelly, because she actually believed I had given her the grapes, will probably become a nurse, or a school teacher, or a happy housewife and president of the local P.T.A.

I discuss this incident because, in April, when this article appears, more persons will probably be changing more environments than at any other time of the year. Ambitious amateur farmers will set out gardens, which will be later abandoned. Youngsters with hatchets will roam the woodlands in search of things to do; housewives will have their spring house cleaning; more lawn mowers will be sharpened in April than in probably any other month, and more garden and lawn tools will be sold in the stores than is usually the case. Since we will most of us be busy at work changing Nature, or at least doing things, let us try for once to fool ourselves and really plan things that we can do, and let us get them done to the end that we may live in a better world.

The day I am writing this I have just completed the purchase, with a friend, of 220 acres of wild land in central New York, a thousand feet higher than the campus of Cornell University. From this spot you can look north half-way up the Finger Lakes, and south almost, if not quite, into Pennsylvania. There is a small stone house there where we can go and be quiet and get ideas for The School Page, and just get ideas for their own sake. Mountain laurel and azaleas will be blooming there not long after you read this, and there will not be an exotic tree or shrub in the neighborhood. The other owner and I hope that we can go there from now on and just forget the wild rat race that drives so many of our friends to an early grave.

I fool the grape vines in my side yard by cutting them back so that, instead of yielding me and the neighborhood youngsters just a luxuriant growth of leaves and vines, they will next fall yield delicious grapes. In my wild area I will do little to change things. We want to see what Nature will do in a few years to abandoned farm house sites, orchards, meadows and potato fields and woodlots. We want to fool wild animals by actually

having a place where they can work out their own problems in their own way, even though we will be spying on them while they are at it. The deer yes, and the bear, the squirrels, rabbits and grouse of the neighborhood must have, if they have survived, developed a profound aversion for man. We want to fool them this time and let them see that a few men, at least, are friendly neighbors. It is fun fooling other creatures in this way, and we hope that some time some of you may drop in on us and let us show you this little sanctuary of ours.

It is possible that, if this sanctuary develops as we hope it will, that other human beings of the major community in which we live will see how much fun we get out of it and that they will want to play a similar "prank" on Nature. It is even possible that the University and the State may become a bit hard-boiled about protecting the wild areas under their control.

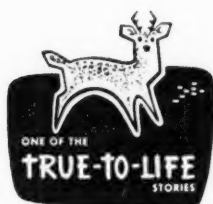
A few years ago the great Montezuma Marshes, a few miles to the north of us, were set aside as an inviolate wildlife area under the jurisdiction of the United States Fish and Wildlife Service. A little more than a year ago, with the approval of that Service, a great "throughway" was laid right across that sanctuary. It developed that, because of the weak bed, the road had to be much wider than was originally agreed. It happens that any good collie could jump over the "deer fence" designed and promised to keep wildlife from leaving this sanctuary and wrecking traffic. In fact a lot of things happened in that Montezuma Marsh sanctuary, which, I am sure, will not happen in my new sanctuary. They are not going to lay any throughway across the top of an 1800-foot elevation in central New York. True, with the coming of television, there may be a demand that we give up this site for a television station, but I can assure you that that idea will not be universally popular where I live.

Somehow, somewhere some of us must "r-r-r" back" on our hind feet and say "so far and no farther." Each of us can keep this in mind this April when we begin cleaning up the back yard. We can see to it that a few square feet are left for the rabbit that may nibble our garden, a few bushes in which song sparrows may nest and rear their young, and maybe a few square inches where at least one last wild flower may continue to hold the fort against the progress of civilization.

In his *Round River* Aldo Leopold tells us of the Wisconsin farmers who surprised the neighborhood by setting out tamarack trees although for years other farmers had spent their time rooting such trees out. For your homework this month read Leopold's chapter in *Round River* on "Natural History, the Forgotten Science." It will be good for your soul, as is most of his philosophy. It may tell you better than I what, in part, I had in mind in writing this page.

This month thousands of Boy Scouts across the country will have dedicated themselves to making their environment better than it has been. Doing this calls for some of the best thinking we can produce. One man may think improvement consists in cutting down a dead tree in a woodlot. Another man may recognize in that tree the only den tree in the neighborhood that will guarantee that squirrels, or raccoons, or owls will remain our neighbors. This major project of the Scouts this year should lead to more careful study of environment, and environment improvement. It will call for a tremendous amount of plain common sense, and an equal amount of resistance to organized groups whose idea of improvement may be highly selfish.

On this page, two months ago, I wrote about the Scout project for 1954. I hope that by now you have procured from your local headquarters, or from the national headquarters, the literature they have developed to attain this end. There may be plenty of local trouble, but this page has every confidence that Ted Pettit of the national headquarters of the Boy Scouts of America has his head set squarely and solidly on his shoulders, and that he is thinking sanely and sensibly about the commission he has been given to get Scouts to make things better in their neighborhood. No one can question the motive back of this movement. It is unselfish. It is designed to make people genuinely and permanently happy. Ted and his associates have worked out the details of a sensible program. It goes into high gear this April. Why not pull a practical April Fool joke on your neighborhood, and on yourself, too, and jump into the



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harness and see what you can do in 1954. Who knows what another year may bring, but all signs point to this year being a banner year for those who like to make things better.

It is in the spring of the year when the number of marriages begin to increase. Then dedicated souls swear to stand by each other, for better or worse, until death do them part. Let us all get married to the idea of making things better to the limit of our capacities.

OUR DIFFICULT CHOICE

(Continued from page 192)

sciences has been so rapid that the most capacious intellect can hardly encompass a single one of them; yet all of mankind's actual knowledge accounts for but a small fraction of what might be known. In comparison with the number of facts we should need to acquire in order to possess complete knowledge, even of our solar system, the number of our daily contacts with other beings is small. By taking thought to make these contacts more harmonious and mutually profitable, perhaps also by reducing their number through simplifying our lives, we can draw ever nearer to our ideal of goodness. Although neither complete knowledge nor perfect goodness is attainable by us, we can come far closer to the latter than the former; and it seems wise to strive toward that goal which we can most nearly reach.

The second consideration is that of intimacy, of whether knowledge or goodness is more central to ourselves, less likely to be lost once it has been won. At this point it may be profitable to recall that we have knowledge but we are good. In becoming good we improve ourselves, in learning facts we amass possessions that may be lost by forgetting. Our gains seem more secure when we refine and ennoble our own nature by living in concord with the things around us than when we merely learn about them. This harmonious association binds us to the living world more firmly than knowledge can, and more completely satisfies that love of living things which led us to consider this perplexing problem.

Seed Production

Vegetable and Flower Seed Production. By Leslie R. Hawthorn and Leonard H. Pollard. New York, 1954. The Blakiston Company. 626 pages. Illustrated.

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Camera Trails

By
EDNA HOFFMAN EVANS

THE other night I tried something new in the line of tabletop photography. It was "new," that is, in the sense that I had never tried it before. What I did was to use projected slides as backgrounds for my tabletop arrangements.

I have taken numerous tabletop pictures in the past, and have written about them several times in previous "Camera Trails" sections. But always the problem of appropriate and natural-looking backgrounds has puzzled me. Sometimes I have tried to build backgrounds, sometimes I have sketched them in, and sometimes I have just ignored them by throwing the background out of focus. But always in the back of my mind was the nagging little wish that I could make use of the many color slides that had accumulated in my file boxes. There were backgrounds—the real McCoy's—but how to get them into the picture?

So the other night, after browsing through various how-to-do-it sources, I finally got the problem figured out. It was quite simple, really, except for one ever-present factor. As usual, before the photographic evening was over, I had dragged out seemingly tons of stuff from closets, boxes, and drawers, plus quantities of brush, twigs, leaves, pebbles, rocks, and the like from outdoors. I moved various heavy items of furniture away from their accustomed places,



Perhaps the "action" here is too violent, but the picture shows the way in which glazed china and wood show up under lights. The background is a picture.

switched the light cords around, and shoved the rugs into corners. It did not seem difficult while I was busy making pictures, but, when the evening was over, what a chore it was to clean the mess away! But so it goes with photography.

To begin with, in tabletop photography, you must decide upon your principals, your models or main actors. With them in mind, you must choose appropriate "props", surroundings or settings of proper size and character. After that, you must work out a satisfactory arrangement or scene.

I began with three different actors. The first was a carved wooden bear, five inches tall. He hailed originally from

Switzerland and he joined the household menagerie last fall. The second was a rearing, spirited palomino horse, ceramic in origin and highly glazed, the leader of an equine family of four that grazes peacefully on the top shelf of my bookcase. The third was a plump and placid wooden monk, black robed and bespectacled, also the product of some Swiss wood-carver's art. Both horse and monk were, like the bear, about five inches tall.

The bear was first in line. He belonged in the mountains, amid tall trees and massive rocks. The problem was to put him there.

As luck would have it, I had in the store-room an empty picture frame, with inside measurements of 18 by 23 inches. This was just the right size for me to tape to it a sheet of white tissue wrapping paper. I did not even bother to iron the paper flat, the creases in it did not matter. The tissue paper, in its frame, was my translucent screen.

I set the frame up, long sides horizontal, on my coffee table and tied it in place. I left a stage just about twelve inches deep in front. About eight feet behind, and slightly to one side, I set up the projector and chose a slide showing a distant mountain slope through a frame of pines. The distance was great enough so that the projected slide nearly filled the screen.

The background taken care of, I proceeded to arrange the foreground. I used a blue bath towel for the "ground." Its rough nap served well enough in the place of grass or forest litter, and yet it was unobtrusive; present but virtually unseen. To bring the forest into the picture, I used the stem of some bush that had gone down before a neighbor's pruning shears. It was the first thing I found; greater care and a longer search, no



Mr. Bear in his woodland surroundings. The foreground "props" are set up in front of a projected mountain scene.

doubt, would have produced a more natural-looking tree trunk.

I set up the "tree" a few inches in front of the screen, stood my bear actor with his wooden paw almost touching it, and arranged a couple of rocks so that they filled the rest of the foreground in a fairly natural-looking manner. Then I checked the scene through the ground-glass of the camera to see what adjustments were needed. The bear had to be turned a little so all of him was in focus the background slide was shifted slightly, the rocks shoved back a fraction of an inch, and so on.

It was at this point that I hit one snag —



This time Mr. Bear is posed against a picture in the background. The "props" are rearranged.

angled double-exposure prevention devices are fine until one really wants to make a double exposure!

For lighting, I used one photoflood lamp, from the left side. My light meter told me the exposure — something like $f/11$ at $1/25$ — for the foreground. This made, I turned out all the lights in the room except that in the projector (which had been turned off while the first exposure was made.) Then I used a 10-second exposure for the background.

The result, I think, is gratifying. Mr. Bear looks quite lifelike amid his mountainous woodland surroundings. There could be, I will admit, changes made in the angle of lighting and in the arrangement of the "props." But the picture shows what I set out to discover. It is possible to use a projected slide as background for a tabletop picture.

The other bear employs many of the same properties, arranged differently. The background, however, is not a slide. Instead, it is a 9 by 12 picture made from a color photograph. I include it to show another possibility so far as tabletop backgrounds are concerned. This set-up necessitated only



The china stallion rears up in a spirited manner against a projected slide of a real pasture.

the camera. I had intended to use my Exakta, since it has a faster lens. But two exposures of the same film were going to be necessary, one for the foreground and one for the background. The Exakta, bless it, is so arranged that a double exposure is impossible. After an exposure is made, a re-set automatically pulls the next film into place. I was too lazy to work out a double time-exposure formula. So I fell back upon the faithful old Graflex. These new-



The plump and placid wooden monk is posed against the projected slide of a real old Spanish mission.

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one exposure.

The other illustrations show different possibilities for tabletop arrangements. The picture of the monk could be greatly improved with a change of lighting. The foreground figure is much too dark, almost a silhouette. The background is a projected slide showing the ruined Tumacacori Mission in Southern Arizona, now a National Monument.

The stallion picture is posed against a projected background, actually a pasture in which real horses were grazing. I did little with the foreground, just enough to "tie-in" my model with the background.

Finally, the picture that shows the stallion and the bear may not be particularly good tabletop technique. I doubt that such violent action should be attempted, particularly with inanimate subjects. I tried it for several reasons. One, I wanted to show the contrast of a glazed china surface (the horse) and a wood surface (the bear) under lights. Second, I wanted to pose them against a picture, not against a projected background. Third, my photoflood bulb had burned out (as photofloods have a habit of doing after considerable use) so I used an ordinary 100-watt lamp in my reflector on the right, and the beam from my projector as a "spot" from the left. The results are there for the observing.

All in all, I think the evening of tabletopping was highly successful. Granted, there can be improvements made in all the pictures. I made six exposures during the evening, five of them are described herein. The sixth, using the monk against a different background, was not good enough for reproduction. I used only a five-second exposure for the background and that was not sufficient.

The pictures are purely experimental, made merely to see whether the techniques were workable. If there were some definite need for finished pictures or salon prints, I would take them over again, re-work them, and try to correct the faults I detect in them. The important thing is that I have shown myself what can be done with foreground figures against projected (or picture) backgrounds. The results were gratifying and the experiments were enjoyable—all except cleaning up and putting things away again after the fun was over.

THE MYSTERY MINK

(Continued from page 186)

the sea mink in his book on Connecticut mammals. He wrote: "The occurrence of large, reddish-brown mink on the Thimble Island off Stony Creek, has been reported by Mr. P. Brown. According to Mr. Brown's statement, years ago a large mink was frequently seen swimming from island to island, and some are still to be found there. On July 4, 1930, he saw a mink swim from a reef to Governor's

Island, and that same year a mink attempted to climb on a dock. Mr. Brown also informs me that mink frequently entered the vacant cottages and one female had a litter of pups on a bed. About ten years ago he saw four young mink playing on the lee of a big rock on the island and near by was a pile of freshly emptied mussel shells. Mr. Brown also tells me of other instances when he has seen mink on the Thimble Islands." Dr. Goodwin has added, perhaps somewhat reluctantly, that "Without an example of this mink for examination, it is not possible to form any definite conclusions as to its identity."

It is always sad to discuss the passing of a member of North America's fauna. True, the sea mink has not enjoyed the notoriety or the widespread lamenting that followed the extirpation of the passenger pigeon or the heath hen. In fact, few conservationists or zoologists have ever heard of the sea mink, principally because of its limited range. It is even more ironical that it was exterminated in fairly recent times without having unveiled its biology to human eyes.

The sea mink, nevertheless, can become a symbol of how easily a rare and locally distributed species can be wiped out. The rapid disappearance of this species, and the rapidly diminishing numbers of many other American mammals, should emphasize that sane protective measures should no longer be delayed.

PAINTED TURTLES IN SASKATCHEWAN

(Continued from page 210)

aries were disappearing. However, they kept one foot on shore, for even the most aquatic, far-roaming turtles return annually to deposit their eggs on land.

Having found a suitable site, the painted turtle proceeds to dig a hole with her powerful hind feet. The opening may be only two inches across but the bottom is much wider and she slowly turns round, using first one foot and then the other, until the hole is as deep as she can reach. In such a cavity, shaped like the old maulage bottles we used to get, Bell's painted turtle usually deposits ten or twelve eggs; fourteen were in the nest I photographed. Then she scrapes whatever debris is lying around over the small opening and returns to the water. The nest-hole I found was dug in a hard-trodden cattle path. I have a record of another one on a trail over which cars occasionally passed, although in both cases softer and more easily worked places were available. These sites were both on well-drained, warm sunny slopes and their selection suggests that they were known and used long before man came to interfere. There is a timelessness about turtles. They saw man come and may see him go. Meanwhile they maintain a superb indifference to man and his

works and follow age-old paths and habits.

The eggs are left to themselves, and I have never heard of a turtle re-visiting the nest after the eggs were deposited and the hole covered. A close observer, however, told me of one that returned and dug out another nest within a few feet of the original one after being picked up and carried some distance before she had time to lay. I am told that the eggs hatch in about three or four weeks and the young ones, miniatures of their parents, immediately head for the water. Their carapaces are bent over in the eggs much as a book is folded, and the fold, curiously like the back of a tiny leather-bound volume, remains as a ridge for a week or more. The dangerous journey to the water is usually made in a straight line, and it seems impossible to make the young turtles go in any other direction.

Anatomy, however interesting, hardly comes within the scope of a field naturalist so I will only say that the brain cavity is very small. However, most readers will recall that a close relative of our painted turtles once won a famous race. And note how they have survived for millions of years after untold numbers of larger and stronger creatures disappeared, so perhaps it is not the size of the brain but its convolutions that matter. The turtles form a link with a remote period when the earth was not the pleasant place it is today, and they show how by adaptability, developing armor and, above all, by keeping out of the way, a primitive and inoffensive type has been enabled to survive through the ages. Painted turtles are calm and phlegmatic and perhaps will outlive many of the more excitable forms of life, so that if the world ever passes through the upheavals and disturbances that have been predicted, they may be among the last living vertebrates.

A REMARKABLE LUNAR ECLIPSE

(Continued from page 213)

during the total phase. In a central eclipse, and a distance as great as a thousand miles, or, in extreme cases, nearly 1900 miles to the nearest edge of the shadow, the illumination is quite uniform and deeply tinged with coppery color over the entire surface of the moon.

The month of April brings many interesting changes in the appearance of the evening sky. The brilliant constellations of winter are now approaching the western horizon. Orion is disappearing in the twilight, but Taurus, and Gemini remain in view. Leo is astride the meridian, Cancer directly to the west of it. Arc-turus is now visible in the northeast, and Spica, in Virgo, is rising above the eastern horizon. Hydra, the sea serpent, one of the longest constellations in the heavens, occupies, with its riders Crater and Corvus, all of the south and south-

eastern part of the heavens. Its head lies directly south of Presepe, The Bee-hive, marked by a group of faint stars. It has, for all of its great length, no star brighter than the second magnitude star, Alphard, southwest of Regulus in Leo. This star is supposed to lie in the heart of the Sea Serpent. The tail of the serpent lies directly west of Scorpio, which has not yet come into view in the southeast.

The shower of meteors known as the Lyrids appears from the direction of Lyra, now below the northeastern horizon. They usually may be seen, but in no great numbers, after midnight, or in early morning hours, about April 21. Strong moonlight will interfere with a good display this year, and probably few, if any, will be seen.

Mercury will be in the morning sky all this month, but too near the sun for observation. Venus is coming conspicuously into view in the evening sky and its position is improving, although it is not far above the horizon early in April, setting then soon after the sun. Mars is now rising near midnight in the constellation of Sagittarius. Its brightness is rapidly increasing and around the middle of April it has become as bright as Canopus. Jupiter is still in Taurus in the western sky and sets before midnight. After Venus sets it is the most brilliant stellar object in view. Saturn is now directly east of Spica in Virgo. In opposition on April 26, it will then be visible all night.

Swift to F & W Service

Ernest F. Swift, Conservation Director of the Wisconsin Conservation Department since 1947, has been appointed Assistant Director of the United States Fish and Wildlife Service. He took over his new post on March 15 and will be primarily concerned with the wildlife activities of the Service. Mr. Swift has been with the Wisconsin conservation department since 1926, and, as its director, has given an administration notable for its vision and modern thinking.

Pacific Fishes

Fishes of the Marshall and Marianas Islands. By Leonard P. Schultz and Collaborators: Earl S. Herald, Ernest A. Lachner, Arthur D. Welander, and Loren B. Woods. Washington, D. C. 1953. Smithsonian Institution. 685 pages. Illustrated. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., \$2.75.

This is a descriptive catalog of the fishes collected in the Marshall Islands in connection with, and after, the atom bomb tests of Operation Crossroads, in 1946. It includes material, also, from the southern Marianas, and descriptions of new species and of new genera from various other regions of the tropical Indo-Pacific region. This is the first volume, covering the families from Asymmetronidae through Siganidae.

Bulletins etc.

"Today's Revolution in Weather" is an interesting discussion of weather and weather changes by William J. Baxter. Based upon world-wide weather studies, this publication rejects the contention that weather "averages out" and contends that, indeed, a meteorological revolution is taking place, and is affecting mankind and his interests in a variety of ways. This extremely interesting book—it has 131 pages—is published by International Economic Research Bureau, 68 William Street, New York 5, New York, at one dollar.

"Whittling Is Easy with X-acto" is a practical, illustrated booklet on wood-carving with an X-acto knife. It is available for twenty-five cents from 48-41 Van Dam Street, Long Island City 1, New York.

"Salt Water Fish of Florida and the Southern Coasts," by Vladimir Walters has excellent color pictures of many of the fishes of the area indicated in the title and brief descriptive text. The illustrations are by Nina Williams. The booklet, of 24 pages, is published by Caribou Press, Box 236, Bronxville, New York, at fifty cents.

"Outdoor Nature Studies" is the title of the Fall, 1953, Cornell Rural School Leaflet, Volume 47, Number 1. It is the work of Dr. Eva L. Gordon and carries on the practical work of this fine series. Twenty-five cents from Department of Rural Education, Cornell University, Ithaca, N. Y.

"Oceanography—Science of the Sea" by John P. Tully is a 20-page bulletin of Department of Fisheries of Canada, Ottawa, Canada.

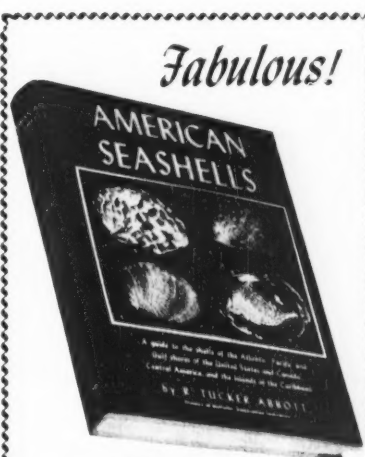
"Pacific Salmon" by William Hagen, Jr., is Circular 24 of the U. S. Fish and Wildlife Service. It deals with hatchery propagation and its role in fishery management, and is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for 30 cents.

Colored pictures available from All-Pets Books, Inc., P. O. Box 151, Fond du Lac, Wisconsin, are double yellow-head parrot, 25 cents; scarlet macaw, 25 cents; sixteen popular and well-known parrots, 50 cents.

Mexican Mammals

Mammals of the Mexican State of San Luis Potosi. By Walter W. Dalquest. Baton Rouge, La. 1954. Louisiana State University Press. \$3.50.

This is Number One in the Biological Science Series of the Louisiana State Universities Studies. It deals with the Mexican State that lies on the eastern side of the Republic of Mexico, a region of arid plains, deserts and desert mountain ranges. Little has been recorded about the mammals that occur in this State, their distribution or natural history. This gap the author has competently filled, and in so doing made a distinct contribution to mammalogy.



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NO SLAVE TO HER GARDEN

(Continued from page 202)

strong, but slender. It waves in the breeze as does ripe grain, its large, bright blooms appearing as though dancing.

We hear a great deal about phlox reverting to some objectionable original color. Magenta is usually the color so despised, although magenta, with white, will do more to brighten a garden than any other color combinations. But we need not argue about magenta, for here there is none. There is a bright rose-pink and crimson, like rambler roses, with a few blooms of true scarlet. There is white, of course, and white faintly flecked with pink. There are blooms the pink of a debutante's blush, if it so be that debutantes still blush, and the vivid pink of the sunset. And, blending as it were all the bright colors into one harmony, is a lovely lavender, which is carried up into the sky by the blooming butterfly-bush. We cannot know what were the colors of the phlox originally planted, but fear of "reversion" is banished where there is a multitude of colors, and where no one shade predominates.

The glow, or the enchanting softness of the garden colors, or perhaps the tint of a particular bloom, changes with the light of morning or of afternoon, with rain or sunshine. It is sometimes startling to see the garden's brilliance soften suddenly as a cloud momentarily obscures the sun. I shall always remember one evening when from the verandah we watched a sunset whose glory spread high in the heavens. The garden was illumined, as though throwing its own light upward. White was pink, and rose became purple, as every shade was intensified. We went down and stood entranced in the midst of the miracle that faded slowly, slowly into night.

These memories carry me away. It is good to come down, to come down literally to the good earth; to consider some of the practical things about a mid-summer garden.

Professor Coconauer, in his revealing book, *Weeds*, tells us to stay our destroying trowels, and to let the weeds help us. He warns us not to uproot all the weeds that send down long, strong roots that break up the subsoil, and bring up minerals that more tender plants cannot reach. He tells us that weeds give our flowers and vegetable-shade during their early growth. He tells us so much that is valuable commonsense that I can only urge you to read for yourself his most readable book. May it not be that in this garden the spring and early summer association of weeds and flowers makes for the more healthy growth of the flowers? And, having gained respect, we come to have affection for weeds. Here in one corner a strong black-eyed-Susan, sharing care

and fertilizer, blooms luxuriantly year by year. After the yuccas and hollyhocks have gone to seed, the sturdy milkweed and the tall candles of the mulleins add height and dignity where needed. At the end of summer, the wild asters fill the gap until the blossoming of the chrysanthemums, which the owner never sees.

And the birds, happy families and welcome migrants! More birds live in this garden than in equally favored spots roundabout. It is because, I believe, when they arrive in the spring there is no human activity. The spring rains keep the bird-baths full, and, there is dense cover, and an inherited memory that they are welcome. What must be the festival of song in those spring months—the robins and wrens, the catbirds and thrashers close around the house, the warblers in the fruit trees, the cardinals and thrushes nearby in the woods. In midsummer, the bobwhite walks confidently across the lawn, and after family cares have been discharged, in the free season before migration, any bird, just any bird, may appear in that garden. Once. . . But I must set a watch upon my wrist and a bridle on my pen. The temptation to write of birds is always strong.

A final remembrance comes to me. From the guest-room on the ground floor, in early morning, the sparkle of the Shrewsbury River comes through the dark spruces that line the boundary. The garden cannot be seen except as reflected in the wide mirror of the dressing-table before which I sit. There it is, a framed picture; beyond the gleam of motors "as up and down the people go." And I must go, too. I put on an unaccustomed hat, pin down a veil, gather up my gloves. But the joy of the garden goes with me, for the picture is framed in my memory.

A BEAVER HOUSE

(Continued from page 211)

interior of a beaver house, and realizing that the arrangement of burrows and rooms might vary with the building site, the problem of a starting point for excavation was settled, after removing the top sticks, by cutting a narrow vertical strip about eighteen inches in front of what appeared to be the center of the house, just wide enough for standing room.

It proved to be a lucky guess, as I reached a pool of water near the front of the dining room without disturbing either burrows or living quarters. Then I worked both ways, as you would slice a loaf of bread.

The mud used for plastering the roof on the approach of winter, then to freeze as a solid sheet, was evidently full of seeds, which germinated in the spring. The result was a mass of roots throughout the soil, in addition to the sticks and

stones used for structural support. I was surprised at the number of stones found, weighing from four ounces to seven pounds. The use of a shovel was impossible, and the use of an axe undesirable due to the stones and the possibility of causing a cave-in. So, the tools used were a key-hole saw to cut out blocks of rooted soil and small sticks, a pair of clippers for roots, a small hand axe and a pair of gloves for a shovel.

I was impressed by the cleanliness of all burrows and living quarters. No refuse or garbage was found. The lake, nearly a mile long, evidently served as a bathroom. To me, as an engineer, the beaver's skill in building this winter home was amazing. The house was the work of an experienced craftsman, as well as a good housekeeper.

A WALKING MOUNTAIN

(Continued from page 203)

fairly inactive. There are slight tremors. Smoke can be seen for miles, and the height remains constant, at about 935 feet.

Investigating geologists feel certain that there is a connection between "Showa Shinzan" and Mt. Usu, just a short distance away. Usu erupted with terrific violence in 1910. Perhaps "Showa Shinzan" is a child of Usu. But Postmaster Masao Mimatsu and his flock remain puzzled by this spasm of nature, which, right in their backyard, transformed peaceful fields of wheat, beans, and rice into the "mountain that walks."

Trees

The Triumph of the Tree. By John Stewart Collis. New York, 1954. William Sloane Associates. 276 pages. \$3.50.

First published in England, this book achieved wide acceptance, and it knows no geographical limitations. The author treats with the tree in the whole economy of Nature; the tree in the folklore, myths and customs of man; the tree as man has treated it, wholesale, and the results of that treatment. It is delightful to read, inspiring in its message and full of information.

Wild Animal Dealing

They Never Talk Back. By Henry Trefflich, as told to Baynard Kendrick. New York, 1953. Appleton-Century-Crofts. 216 pages. Illustrated. \$3.50.

Henry Trefflich is said to be the "largest wholesale wild animal dealer in the world." This is an intricate business. This dealer has told some of his interesting and varied experiences to his co-author, and the result makes most enjoyable reading, although we found ourselves wishing that some of the animals that never talk back could do so and tell their captors and handlers what they really think of them.

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UNDER THE MICROSCOPE

By JULIAN D. CORRINGTON

ORGANIC ROPES

AMONG the toughest, densest and strongest of all the tissues of the body are tendons. Primitive peoples have used animal tendons for many purposes in fastening one object to another, as axe-head to shaft, in lieu of cord, rope, or wire. The older term, *sinew*, is synonymous with strength, as "the sinews of war," or

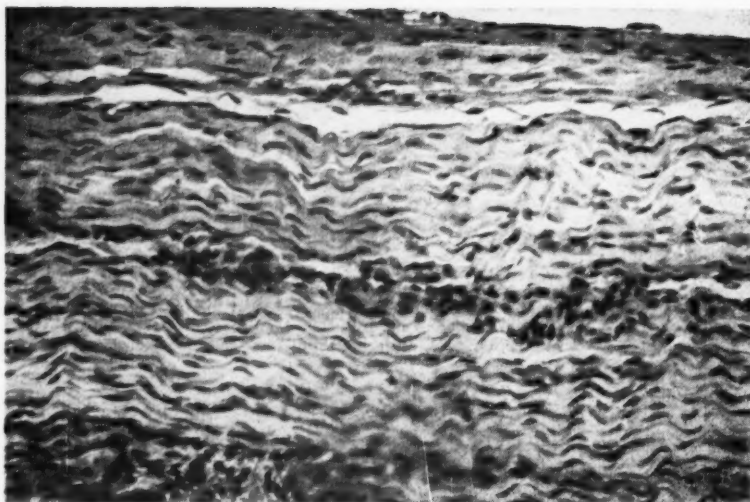
"The smith, a mighty man is he,
"With large and sinewy hands."

Yet the word we now use is inappropriate, for *tendon* is from the Latin *tendere*, to stretch, and that is exactly what they do not do. Tendons fasten muscles to bones, transmitting the force of muscular contraction to the object to be moved, and if they stretched, it would be a case of labor lost. Although the work of a tendon is entirely passive, just as if the muscle was tied to bone with a rope, it is none the less important, for the joining structure must be inelastic, flexible, and very strong. Anyone knows the serious and disabling nature of pulling a tendon in an athletic contest.

Under the microscope the structure of tendon is fairly simple. Used generally, in this fashion, tendon indicates a kind of tissue, widespread in occurrence throughout the body; used specifically, each of the larger tendons is an organ, equipped with accessory tissues that enable it to perform its task. That one best known to the general reader is the tendon of Achilles, a name that perpetuates one of the most famous of Trojan War myths. His mother, Thetis, had dipped Achilles in the river Styx, thus making him invulnerable except in the heel by which she held him, and here he was wounded by an arrow shot by Paris. So died the hero of the *Iliad*. The structure concerned is the heavy cord one feels at the back of the heel, just above the heel bone, and is the common tendon of insertion of the several calf muscles, contraction of which extends the foot.

To appreciate how this apparatus works, stand erect with the feet together, then rise on the balls of the feet. The muscles that perform this act of lifting your weight against gravity transmit their force through the *tendo achillis* to the heel bone, and this is one of the main driving forces employed when the foot pushes against the ground in walking, running, and dancing.

Histologically, tendon is one of the several forms of connective tissue, some others being loose connective tissue, fat, cartilage, and bone. The loose or areolar form is a basic one to study with regard



PHOTOMICROGRAPHS FROM SLIDES LOANED BY WARD'S NATURAL SCIENCE ESTABLISHMENT, INC.

Longitudinal section of tendon, 325X.

to the many constituents and their relationships; there are numerous cell types, a cement ground substance, and two kinds of fibers, white and yellow. White fibers are called also collagenous, being made of *collagen*, an anhydrous form of gelatin, abundant in tendon, cartilage, and bone. It is, in fact, from these tissues that commercial gelatin and glue are obtained. White fibers are made of fine fibrils that run in wavy bundles; the bundles are of different sizes and they branch and anastomose (join with others, forming cross trunks) but the fibrils do not. Elastic or yellow fibers, on the other hand, are single and are not divisible into fibrils, their diameter varies, they branch and anastomose, are yellowish in color, and are highly elastic, stretching to a considerable degree, then returning to their original state when the tension is relaxed.

Connective tissue cells all trace their lineage back to the mesenchymal cell, mesenchyme being the embryonic form of connective tissue. Of adult cells from this source, the least modified is the *fibroblast*, so named because functioning in the manufacture of fibers. There have been arguments in the past as to whether these cells produced the fibers within their own substance (intracellular theory), or produced secretions which then condensed or crystallized in the intercellular spaces (extracellular theory). The latter view is now generally adopted. Collagen may be seen to form in tissue cultures, for example, arranged as fine, wavy fibrils between cells. Tendon is a form of condensation of this tissue, with the fiber bundles organized as very dense and regular rows of *tendon fibers*, closely packed. There are some fine elastic fibers between the bundles, but insignificant in amount.

In longisection, tendon exhibits so wavy an appearance as to remind one of waves on the bounding main. The fiber bundles are white and alternate with rows of black *tendon cells*. These are fibroblasts and

are the only cells to be found in this tissue, aside from those related to the scanty blood and nerve supply. The tendon cells are arranged one after another, the nuclei bulging and the thin cytoplasm of one cell continuous with that of the next, so that the primitive anastomoses of mesenchyme cells is retained. In cross section, high power, the tendon fibers appear as white polyhedral areas bounded by wing or collar-like projections of the cytoplasm of the cells. The nuclei are jet black under routine stains, irregular in shape because of the cell processes that seem to extend from them—actually cytoplasmic—some of which are seen to anastomose with those of neighboring cells, thus enclosing a fiber bundle more or less completely.

Under low power, tendon as an organ may be studied in cross section, where it is seen to consist of primary bundles of tendon fibers that are gathered together into secondary or larger bundles termed *fasciculi* (singular, *fasciculus*), from Latin, a little *fascies*. The bundle of sticks with an axe in the middle, carried by Roman victors, was the *fascies*, and from this was named the Fascist Party of recent Italian history.

The fasciculi are separated by loose connective tissue, the *septum* or partition. The material of the septa blends at the surface of the tendon with the fibrous sheath or *vagina fibrosa* and transmits blood vessels and nerves to the interior of the tendon. The larger tendons are composed of several fasciculi and have a *vagina mucosa*, or mucous sheath, filled with a watery fluid and some mucous-like material to permit the tendon to work back and forth freely, like a piston in its cylinder.

At one end tendon connects to muscle and at the other end to bone, in typical cases. The exact nature of the union of tendon and skeletal muscle has never been settled, some holding that the muscle fibers are directly continuous with tendon fibers (continuity theory), there being a

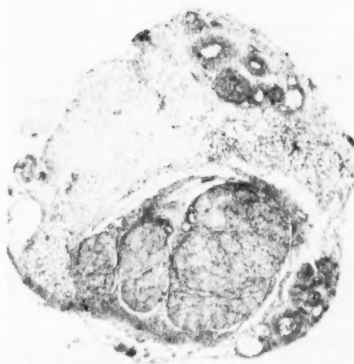
gradual transition from one substance to the other. Different investigations tend to show that the two kinds of fiber are separate but joined end to end (apposition theory). On approaching bone, tendon fibers penetrate into the substance of the bone itself as the *perforating fibers of Sharpey* (this Department, May, 1950), providing an extremely strong attachment. Tendons may even be made of bone, as anyone knows who has tackled a turkey drumstick at the great American Thanksgiving gorge. A nodule of bone may develop in the course of a tendon, especially where it passes over another bone, and such *sesamoid bones* are numerous in most higher animals. The patella or kneecap is the most prominent such tendon bone in the human skeleton, but there are many others in the hands and feet.

Tendons have few blood vessels, but do have sensory nerve fibers that begin as *tendon spindles*, or as simple, tree-like, branching free endings. These fibers convey sensations of pressure, pain, and tension.

Thus far we have been describing cylindrical tendons, continuous with round muscles. But many muscles of the body are flat sheets, and these are anchored by similarly flat sheets of white fibrous connective tissue termed *aponeuroses*. These flat tendons may attach to bone, to connective tissue septa, or may arise from the *fascia* or muscle sheath, one flat muscle frequently taking off from the surface of another. Every muscle is surrounded by an envelope of dense white fibrous tissue, the *fascia*, which is readily made continuous with an aponeurosis since they are composed of the same materials.

Tendons permit action at a distance, one of the governing principles of muscular action. To appreciate this fact, roll up your sleeve and watch your forearm while you clench your fist tightly. The cords seen at the wrist and in the lower arm are tendons of insertion of muscles situated in the upper forearm. On the palm side these are flexor muscles, on the back of the hand and wrist they are extensors. In either case, the muscles are not located on or near the bones to be moved, but are some distance away, and operate through long tendons. This arrangement allows the wrist, hand, and fingers to remain slender, for manipulative purposes, and relegates the massive muscles to a region of the arm where bulk does not interfere with fine work.

The hamstrings of man are the great tendons of the thigh muscles seen at either side of the rear of the knee joint, making the hollow behind the knee; they are easily felt if one holds them between thumb and forefinger of each hand while swinging the lower leg from the knee. Man's inhumanity to man has in the past included, among numberless brutalities, the severing of these tendons by a blow from an edged weapon, completely disabling the victim. In animals, through



Cross section of tendon, 36X.

mistaken identity of ankle for knee, it is the Achilles tendon that is referred to as the hamstring. By extension, the verb has come to mean the wrecking of any enterprise.

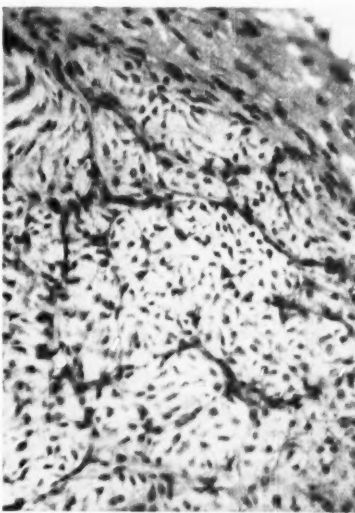
MICROSCOPE MAKERS



X. Friedrich Belthle

OUR first installment in the history of the Leitz organization dealt with the life and attainments of Carl Kellner, the founder (Nov., 1952, issue). One year after the death of this remarkable young man, his widow married Belthle, who thus succeeded to management of the business that had been established at Wetzlar, Germany, in 1849.

Christian Friedrich Belthle, born February 27, 1829, in Bebenhausen, near Tübingen, married the widow Kellner in December, 1856. He had worked for some years as Kellner's assistant and was eager and determined to carry on the undertaking in the master's spirit. There was



Cross section of tendon, 560X.

evidently some apprehension in nearby scientific circles lest the quality of Kellner productions deteriorate in the absence of the founder's guiding hand for, in 1857, a committee of four professors of the University of Giessen made a critical comparison of microscopes made by Kellner and those of Belthle, and published their report. The chairman was Professor Welcker, later occupant of the chair of anatomy at Halle, and the others were Leuckart, Phoebus and Wernher. They put their stamp of approval on Belthle's instruments, finding them to compare favorably with Kellner's. The great anatomist and physiologist Bischoff was an especial patron, Steinhilber the physicist continued his correspondence with the firm, and the names of Gegenbaur and Küchenmeister, illustrious in the field of parasitology, also appear as customers.

In one of his letters to Bischoff, Belthle tells of the difficulties of the optical worker in the dark winter months, with the fine adjusting work limited to a few hours a day because of the lighting conditions of that time. He also corresponded with Rudolph Virchow, founder of cellular pathology, and sold instruments to that famous physician's new Institute of Pathology at Berlin. Rudolph Leuckart, in his well-known *Researches on Trichina spiralis*, 1866, recommended Belthle's microscopes and also his tripod magnifiers for ment inspection.

In August, 1857, H. Rexroth entered the firm as a partner, the official title of the company becoming "Fr. Belthle and H. Rexroth, formerly C. Kellner." This newcomer left in 1861, to busy himself with the building of telegraphic installations. Optical glass was obtained from Theodore Daguet in Solothorn, and even after Daguet moved to Switzerland, Belthle would accept no substitute and maintained the connection by means of barter, a telescope from Belthle to pay for a shipment of crown and flint glass blanks from Daguet.

The weekly payroll in the year 1858 carried the names of only five employees: Gundlach, who drew the top wage of four thaler, three silver-groschen (one of these was one-thirtieth of a thaler), Rumann, Kramer, Wilhelm Seibert and Heinrich Seibert, who received the lowest pay, one thaler and twenty-six silver bits. About seventy microscopes were manufactured yearly, but in 1866 as many as 160 were constructed. On September 3, 1867, the thousandth microscope left the little factory. But the last years under Belthle, from 1866 to 1869 showed a steady decline in income, from 5960 to 2434 thaler. The inventory of 1869 listed one large and two smaller grinding wheels, one homemade and two iron benches, with various vises, lamps, and small tools. Lacquering was done over a spirit lamp, and the inventory carried the entry of one large and one small bottle of lacquer. Total value of all equipment and raw materials was put at 334 thaler.

The portrait of Belthle shows a full-

bearded, dark-haired man of somewhat cadaverous features, with an introverted and brooding, worried look—the countenance of a man who is coping with a task that is just over his head—yet withal an intellectual face. He was satisfactory but not outstanding in genius and neither did he possess any marked ability as a business manager. The thirteen years of his superintendency, if looked at from the standpoint of the total development of the Leitz establishment, were reasonably successful in carrying on the work of Kellner and bridging the gap to Leitz, maintaining the nucleus of an industry

that was destined to become so important to the people of Wetzlar.

Among the assistants to Belthle was Karl Junker, of Giessen. This young man was later to initiate the celebrated foundry of Junker and Ruh in Karlsruhe, but he enters our account because it was at his instigation and through his mediation that Ernst Leitz, at the close of a sojourn in Switzerland, came to Belthle in Wetzlar. He joined the firm on December 23, 1865, and when Belthle succumbed to a severe illness on May 9, 1869, it was the genial Leitz, the senior of two men bearing the same name, who henceforth developed the

little enterprise into a great world industry.

BIOCENTENNIALS

Marco Polo (1254-1323)

SEVEN hundred years ago the Venetian traveler, Marco Polo, was born. He was by far the most celebrated of globe-trotters in the age of land travels that preceded the great ocean voyages of discovery. With his father and uncle he set forth in 1271 on an overland route to China, remaining until 1292. His return trip was mostly by sea, arriving in Venice three years later. In those days such a journey was long, slow, arduous and perilous, and one remained at the destination for a lengthy period.

Polo's sojourn in China occurred during the reign of Kublai Khan, the Mongolian Emperor of fabulous memory. The Venetian brought back to Europe the first detailed and authentic account of China, its peoples and their customs. In 1298, while a captive of the Genoese, Polo dictated the tale of his journey to a fellow prisoner. First written in French, the narrative astounded all who read it; in fact, it was so remarkable as to be generally considered fictitious.

Polo was the first European to traverse Asia completely. The *Travels* described the geography and scenery of places along the route and dealt with the minerals, plants, and animals encountered, as well as with the people. In his book, Marco provided Europe with its first taste of Asiatic natural history, adding much to the limited botanical and zoological knowledge of his day.

SONGS FOR ZOOLOGY

Working on the Dogfish Working on the Railroad

I've been working on the dogfish
All the livelong day,
I've been working on the dogfish
Just to pick the meat away.
Can't you smell the maceration
From Maine to Cal-i-for-ni-a?
All the people of the nation
Say, "Can't eat fish today!"

SONGS FOR ZOOLOGY

Lab. Regulations People Will Say We're in Love Richard Rogers Oklahoma!

Don't let your shark get dry,
Don't throw trash in the sink,
Your desk is all stained with ink,
People will say you're a goop.
Don't call the Prof. "Hey, Guy!"
Don't let your scalpels rust,
You've got all your drawings mused,
People will say you're a goop.
Don't cross your label lines,
When the bell rings do not whoop,
Don't write on the table signs,
People will say you're a goop!

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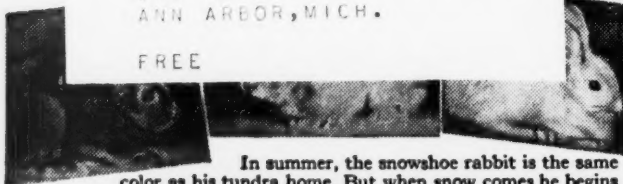
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